# 96M5990o

## Intel ® 4th Generation Core / QM87 PCH
## Mini ITX Motherboard

# USER'S MANUAL

**Version 1.0**

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# Table of Contents


## Introduction ..... 1

Product Description. ..... 1
Checklist. ..... 1
96M5990o Specifications ..... 2
Board Dimensions ..... 4

## Installations ..... 5

Installing the Memory ..... 6
Setting the Jumpers ..... 7
Connectors on 96M5990o. ..... 12

## BIOS Setup ..... 25

## Drivers Installation ..... 51

Intel Chipset Software Installation Utility ..... 52
VGA Drivers Installation ..... 54
Realtek HD Audio Driver Installation ..... 56
LAN Drivers Installation. ..... 58
Intel® Management Engine Interface ..... 61
Intel® USB 3.0 Drivers. ..... 64

## Appendix. ..... 67

A. I/O Port Address Map ..... 67
B. Interrupt Request Lines (IRQ) ..... 68
C. Watchdog Timer Configuration ..... 69

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# Introduction

## Product Description

The 96M5990o Mini ITX motherboard is based on the latest Intel® QM87 chipset. The platform supports onboard 4th generation Intel® Core processor family features an integrated dual-channel DDR3 memory controller as well as a graphics core.

The latest Intel® processors provide advanced performance in both computing and graphics quality. This meets the requirement of customers in the gaming, POS, digital signage and server market segment.

The QM87 platform is made with 22-nanometer technology that supports Intel's first processor architecture to unite the CPU and the graphics core on the transistor level. The 96M5990o Mini ITX board utilizes the dramatic increase in performance provided this Intel's latest cutting-edge technology. Measuring 170mm x 170mm, the 96M5990o offers fast 6Gbps SATA support, USB3.0 and interfaces for DVI-D, DVI-I, LVDS and DP displays.

## Checklist

Your 96M5990o package should include the items listed below.

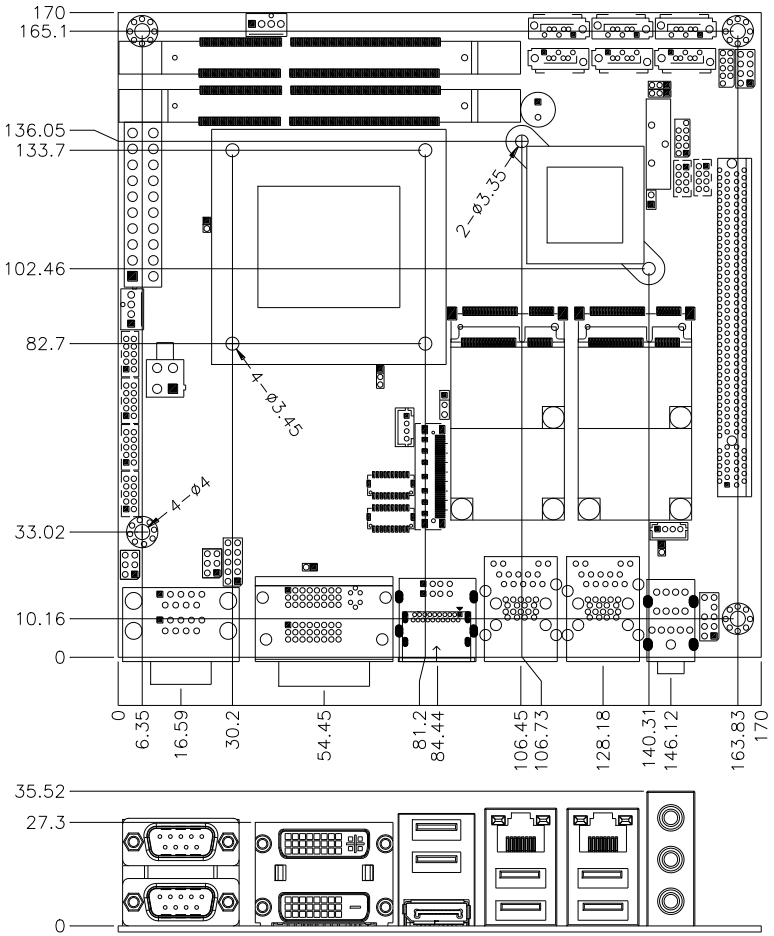
- The 96M5990o MINI ITX motherboard
- This User's Manual
- 1 CD containing chipset drivers and flash memory utility
- Serial ATA cable

# 96M5990o Specifications

| | |
|---|---|
| **Product Name** | **96M5990o [Supports iAMT 9.0 & vPro]** |
| **Form Factor** | Mini-ITX |
| **CPU Type** | - Intel® 4th Generation Core mobile processors (22nm monolithic)<br>- BGA1364 , Package= 37.5 mmx 32 mm [Performance Halo SKUs]<br>- TDP = 47W (QC) / 37W(DC) |
| **Cache** | Up to 8MB |
| **Chipset** | Intel® QM87 PCH Mobile Platform Controller Hub Package =23 mm x 22 mm, 0.65 mm ball pitch; TDP = 3W |
| **BIOS** | AMI BIOS [16MB SPI ROM] |
| **Memory** | Intel® 4th Generation Core mobile processors integrated memory controller<br>DDRIII 1600 MHz (supports dual channel DDR3/DDR3L)<br>- SO-DIMM [204-pin vertical type] x 2 (Non-ECC), Max. 16GB |
| **VGA** | Intel® 4th Generation Core mobile processor integrated HD Gfx, supports 3 independent displays, Direct X 11.1, OpenGL 3.2, Open CL 1.2<br>● DVI-I X 1 (Thru port B, via VGA@ QM87 PCH+ Level shifter ASM1442)<br>● DVI-D x 1 (Thru port C, with level shifter ASM1442)<br>● DisplayPort x 1 (Thru port D)<br>● LVDS (Thru eDP, via NXP PTN3460) |
| **LAN** | 1. Intel® Clarkville I217LM GbE PHY<br>** Package = 6mm x 6mm, QFN48**<br>2. Intel® Pearsonville I211AT as 2nd GbE |
| **USB** | USB ~~2.0~~ host controller [QM87 PCH integrated], supports **8** ports<br>- 2 ports in the rear panel<br>- 4 ports via onboard pin header (~~2.0~~mm pitch)<br>- 2 ports via MiniPCIe sockets<br>USB 3.0 host controller [QM87 PCH integrated] supports **4** ports<br>- 4 ports in the rear panel |
| **Serial ATA** | Intel® QM87 PCH built-in SATA controller, supports 6 ports<br>**4** x SATA (3.0) 6Gbps & shared mSATA for 1 port (SATA port #5)<br>**2** x SATA (2.0) 3Gbps |
| **Audio** | Intel® Mobile QM87 PCH built-in High Definition Audio controller + Realtek ALC892 w/ 7.1 channels |
| **LPC I/O** | Fintek **F81866AD-I** (128-pin LQFP [14mm x 14 mm])<br>- COM #1 (RS232/422/485) supports ring-in with power @500mA (selectable for 5V or 12V) [EXAR SP339EER1 232/422/485 transceiver x 1 for jumper-less]<br>- COM #2 (RS232 only), supports ring-in with power @500mA (selectable for 5V or 12V)<br>- COM #3~COM #6 (RS232 only)<br>Hardware Monitor (2 thermal, 4 voltage monitor inputs & 2 fan headers)<br>- CPU fan x 1(PWM fan type, 4-pin connector)<br>- SYS fan x 1 (DC/PWM Auto-Detect fan type, 4-pin connector)] |
| **Digital IO** | 4 in & 4 out |
| **TPM 1.2** | Nuvoton WPCT210AA0WX<br>**Operation temperature for 0 ~ +60 degree C only** |
| **iAMT** | Intel® Mobile QM87 PCH built-in<br>- Intel® Active Management Technology, version 9.0 |
| **Expansion Slots** | - PCI-Express (16x) x1 [Gen 3.0 PEG]<br>- Mini PCI-Express x 2 port [Full-sized], both support USB 2.0<br>- One slot supports mSATA (6Gbps) |

| | |
|---|---|
| **Edge Connectors** | Dual DB9 stack connector for COM #1 / #2<br>DVI-D + DVI-I stack connector x 1<br>DisplayPort + dual USB (2.0) stack connector x 1<br>RJ-45 + dual USB (3.0) stack connector x 2<br>Triplet type Jack 3 x 1 for HD Audio |
| **Onboard Header/Connector** | 4 ports x SATA **III** [Blue color]<br>2 ports x SATA **II**<br>DF-11 8-pin connector x 2 for 4 ports USB 2.0<br>DF-20 20-pin connector x 2 for dual –channel LVDS<br>eDP LVDS panel connector x 1<br>2x5 pin-header x 1 for front panel audio [supports 7.1 Channel]<br>DF-11 10-pin header x 4 for COM3 ~ COM6<br>2x5 pin-header x 1 for Digital IO<br>4-pin box header x 1 for LCD backlight control |
| **Watchdog Timer** | Yes (256 segments, 0, 1, 2…255 sec/min) |
| **System Voltage** | ATX standard 20-pin type<br>4 pin type (+12V only)[For full system loading usage] |
| **Others** | - vPro<br>- ErP feature (F81866AD-I integrated, WOL from 2nd GbE)<br>- iSMART ( via TI MSP430G2433 MCU)<br>- AT24C02C EEPROM [SO8 type] via SMbus (Reserved) |
| **Board Size** | 170mm x 170mm |

# Board Dimensions



# Installations

This section provides information on how to use the jumpers and connectors on the 96M5990o in order to set up a workable system. The topics covered are:

Installing the Memory..... 6
Setting the Jumpers..... 7
Connectors on 96M5990o . ..... 12

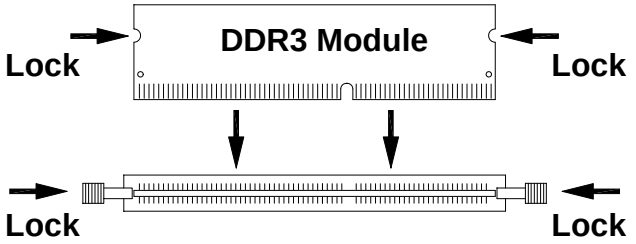
# Installing the Memory

The 96M5990o board supports two DDR3 memory socket for a maximum total memory of 16GB in DDR3 SODIMM memory type.

**Installing and Removing Memory Modules**

To install the DDR3 modules, locate the memory slot on the board and perform the following steps:

1. Hold the DDR3 module so that the key of the DDR3 module aligned with that on the memory slot.
2. Gently push the DDR3 module in an upright position until the clips of the slot close to hold the DDR3 module in place when the DDR3 module touches the bottom of the slot.
3. To remove the DDR3 module, press the clips with both hands.

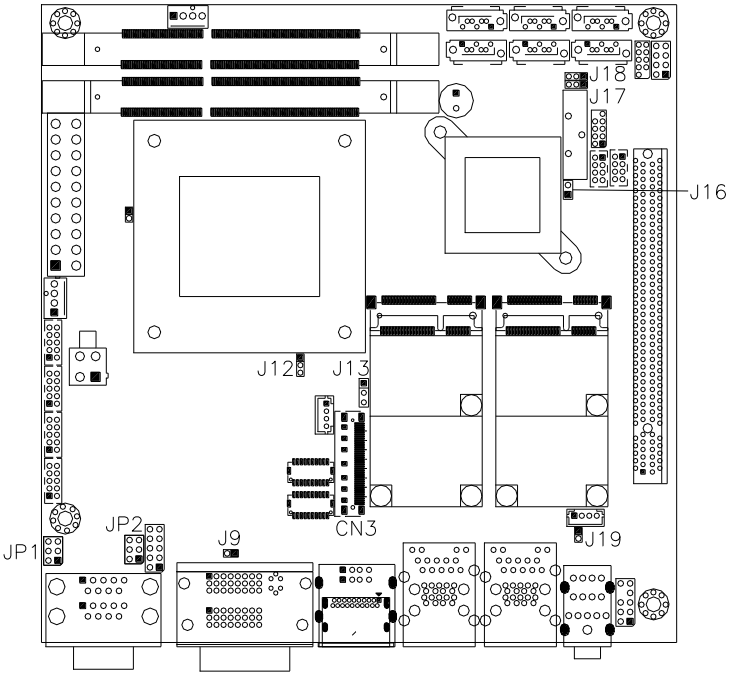


# Setting the Jumpers

Jumpers are used on 96M5990o to select various settings and features according to your needs and applications. Contact your supplier if you have doubts about the best configuration for your needs. The following lists the connectors on 96M5990o and their respective functions.

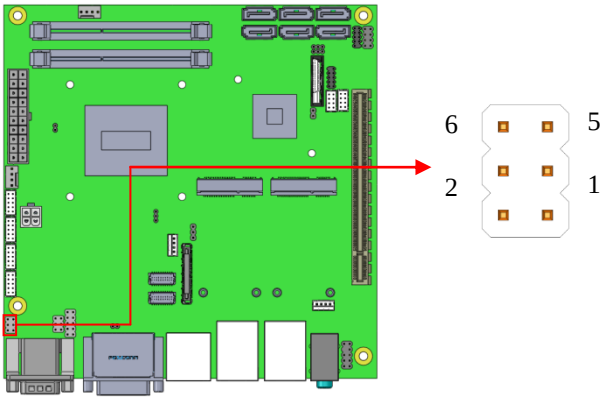
Jumper Locations on 96M5990o ..... 8
JP1: COM2 RS232 RI/+5V/+12V Power Setting. ..... 9
JP2: COM1 RS232 RI/+5V/+12V Power Setting. ..... 9
J13: LCD Panel Power Selection. ..... 10
J16: Flash Descriptor Security Override (Factory use only) ..... 10
J17: Clear CMOS Contents ..... 11
J18: Clear ME Contents ..... 11

## Jumper Locations on 96M5990o



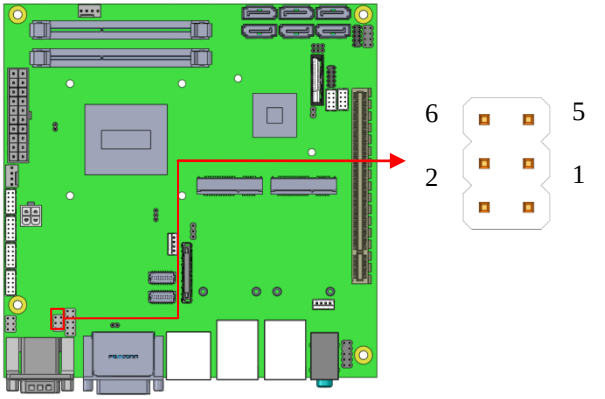

Jumpers on 96M5990o ..... Page
JP1: COM2 RS232 RI/+5V/+12V Power Setting ..... 9
JP2: COM1 RS232 RI/+5V/+12V Power Setting ..... 9
J13: LCD Panel Power Selection ..... 10
J16: Flash Descriptor Security Override (Factory use only) ..... 10
J17: Clear CMOS Contents ..... 11
J18: Clear ME Contents ..... 11

## JP1: COM2 RS232 RI/+5V/+12V Power Setting



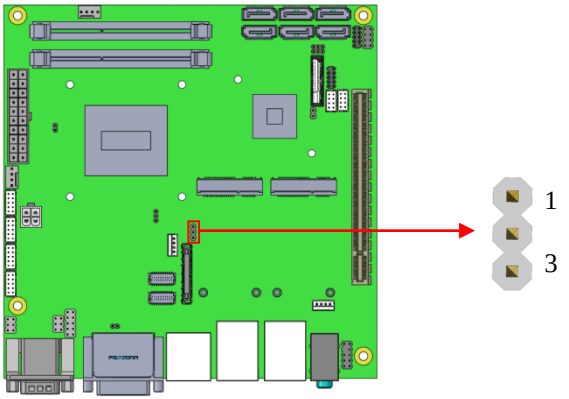

| JP1 | Setting | Function |
|---|---|---|
| | Pin 1-3, Short/Closed | +12V |
| | Pin 3-4, Short/Closed | RI |
| | Pin 3-5, Short/Closed | +5V |

## JP2: COM1 RS232 RI/+5V/+12V Power Setting



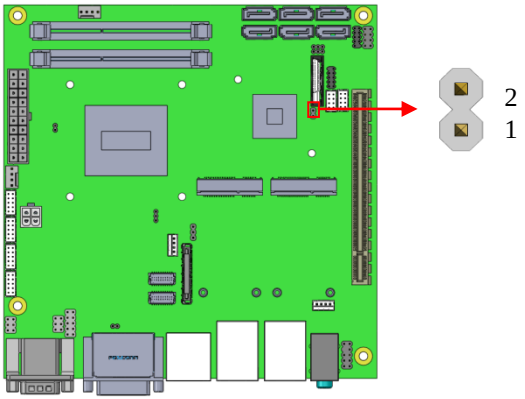

| JP2 | Setting | Function |
|---|---|---|
| | Pin 1-3, Short/Closed | +12V |
| | Pin 3-4, Short/Closed | RI |
| | Pin 3-5, Short/Closed | +5V |

## J13: LCD Panel Power Selection



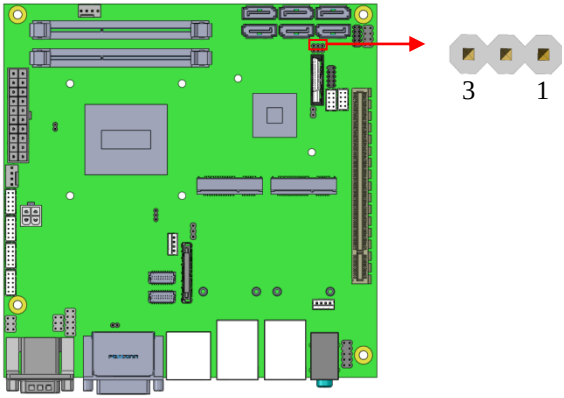

| J13 | LCD Panel Power |
|---|---|
| | 3.3V |
| | 5V |

## J16: Flash Descriptor Security Override (Factory use only)



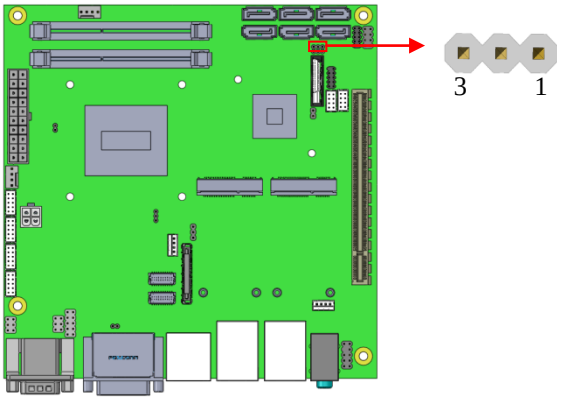

| J16 | Flash Descriptor Security Override |
|---|---|
| Open | Disabled (Default) |
| Close | Enabled |

### J17: Clear CMOS Contents




| J17 | Setting | Function |
|---|---|---|
| | Pin 1-2 Short/Closed | Normal |
| | Pin 2-3 Short/Closed | Clear CMOS |

### J18: Clear ME Contents

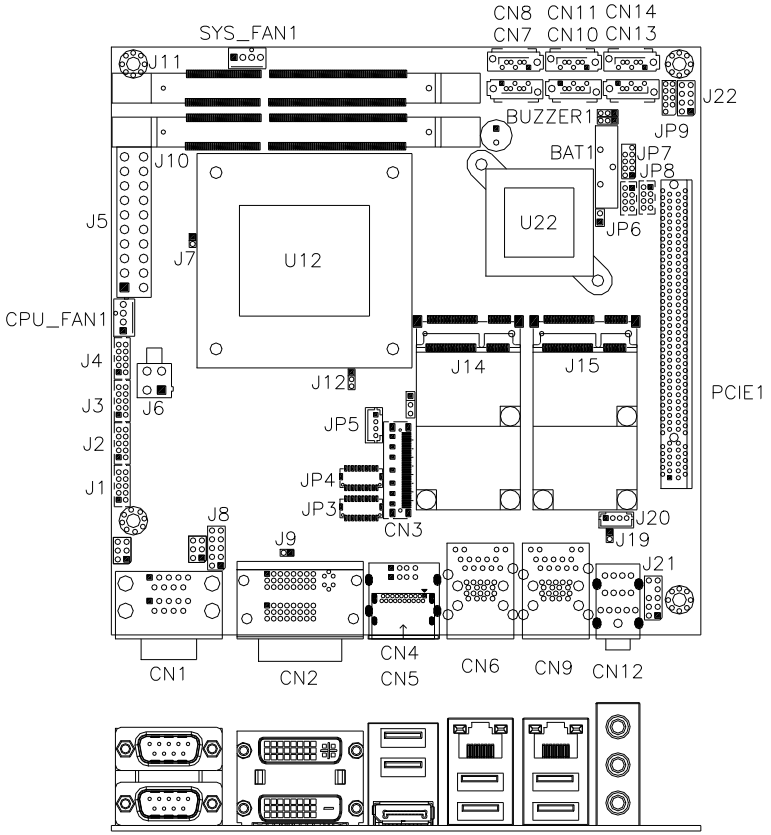


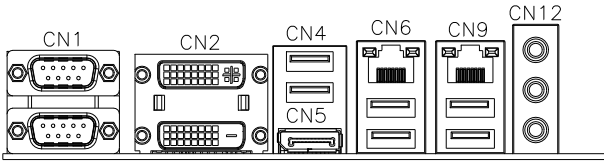

| J18 | Setting | Function |
|---|---|---|
| | Pin 1-2 Short/Closed | Normal |
| | Pin 2-3 Short/Closed | Clear CMOS |

# Connectors on 96M5990o

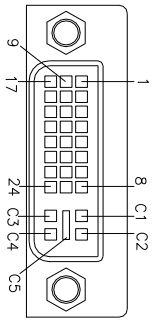
Connector Locations on 96M5990o ..... 13
CN2: DVI-I and DVI-D Connector. ..... 14
CN1: COM1 and COM2 Serial Ports. ..... 15
CN4: Display Port ..... 15
CN5: USB2 #6/#7 ..... 15
CN6: Gigabit LAN (I217) + USB3 #0/#1. ..... 15
CN7, CN8: SATA3 Connectors. ..... 15
CN9: Gigabit LAN (I211) + USB3 #2/#3. ..... 15
CN3: eDP Connector (JAE_FI-TD44SB-E-R750) ..... 16
CN10: SATA2 Connector ..... 17
CN11: SATA2 Connectors ..... 17
CN12: HD Audio Connector ..... 17
CN13: SATA3 Connector ..... 17
CN14: SATA3 Connector ..... 17
JP3, JP4: LVDS Connectors (LVDS2, LVDS1). ..... 17
JP5: LCD Backlight Connector. ..... 18
JP6, JP8: USB2 #8/#9, USB2 #4/#5 Connectors ..... 18
J1, J2, J3, J4: COM6, COM5, COM3, COM4 RS232 Serial Ports ..... 19
J5: ATX Power Supply Connector. ..... 19
J6: ATX 12V Power Connector ..... 20
JP7: LPC debug Connector (Factory use only) ..... 20
JP9: SPI Flash Connector (Factory use only). ..... 20
J7: PCIE1 Configuration ..... 21
J8: Digital I/O Connector (4 in, 4 out) ..... 21
J10, J11: DDR3 SO-DIMM Socket ..... 21
J12: LVDS/eDP Select ..... 22
J21: Audio Pin Header for Chassis Front Panel ..... 22
J22: Front Panel ..... 23
CPU_FAN1: CPU Fan Power Connector ..... 23
SYS_FAN2: System Fan Power Connector (DC/PWM Auto-Detect) .24
J14: Mini PCIE/mSATA (share with CN7) Connector ..... 24
J15: Mini PCIE Connector ..... 24

## Connector Locations on 96M5990o

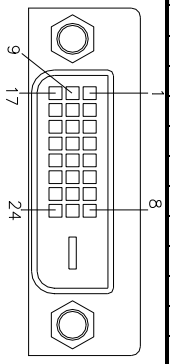




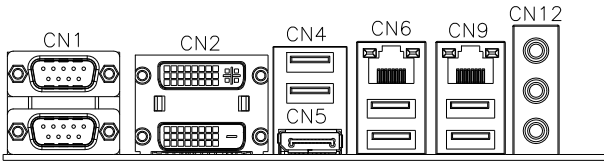

## CN2: DVI-I and DVI-D Connector



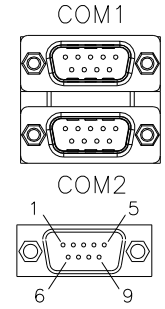

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| DATA 2- | 1 | 16 | HOT POWER |
| DATA 2+ | 2 | 17 | DATA 0- |
| Shield 2/4 | 3 | 18 | DATA 0+ |
| DATA 4- | 4 | 19 | SHIELD 0/5 |
| DATA 4+ | 5 | 20 | DATA 5- |
| DDC CLOCK | 6 | 21 | DATA 5+ |
| DDC DATA | 7 | 22 | SHIELD CLK |
| Analog VSYNC | 8 | 23 | CLOCK - |
| DATA 1- | 9 | 24 | CLOCK + |
| DATA 1+ | 10 | C1 | Analog Red |
| SHIELD 1/3 | 11 | C2 | Analog Green |
| DATA 3- | 12 | C3 | Analog Blue |
| DATA 3+ | 13 | C4 | Analog HSYNC |
| DDC POWER | 14 | C5 | A GROUND2 |
| A GROUND 1 | 15 | C6 | A GROUND3 |




| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| DATA 2- | 1 | 16 | HOT POWER |
| DATA 2+ | 2 | 17 | DATA 0- |
| Shield 2/4 | 3 | 18 | DATA 0+ |
| DATA 4- | 4 | 19 | SHIELD 0/5 |
| DATA 4+ | 5 | 20 | DATA 5- |
| DDC CLOCK | 6 | 21 | DATA 5+ |
| DDC DATA | 7 | 22 | SHIELD CLK |
| N.C | 8 | 23 | CLOCK - |
| DATA 1- | 9 | 24 | CLOCK + |
| DATA 1+ | 10 | C1 | N.C. |
| SHIELD 1/3 | 11 | C2 | N.C. |
| DATA 3- | 12 | C3 | N.C. |
| DATA 3+ | 13 | C4 | N.C. |
| DDC POWER | 14 | C5 | N.C. |
| A GROUND 1 | 15 | C6 | N.C. |




**CN1: COM1 and COM2 Serial Ports**




| Pin # | Signal Name | | |
|---|---|---|---|
| | RS-232 | R2-422 | RS-485 |
| 1 | DCD | TX- | DATA- |
| 2 | RX | TX+ | DATA+ |
| 3 | TX | RX+ | NC |
| 4 | DTR | RX- | NC |
| 5 | Ground | Ground | Ground |
| 6 | DSR | NC | NC |
| 7 | RTS | NC | NC |
| 8 | CTS | NC | NC |
| 9 | RI | NC | NC |
| 10 | NC | NC | NC |

**CN4: Display Port**

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| LANE0_P | 1 | 11 | GND |
| GND | 2 | 12 | LANE3_N |
| LANE0_N | 3 | 13 | GND |
| LANE1_P | 4 | 14 | GND |
| GND | 5 | 15 | AUX_P |
| LANE1_N | 6 | 16 | GND |
| LANE2_P | 7 | 17 | AUX_N |
| GND | 8 | 18 | HPD |
| LANE2_N | 9 | 19 | GND |
| LANE3_P | 10 | 20 | VCC3. |

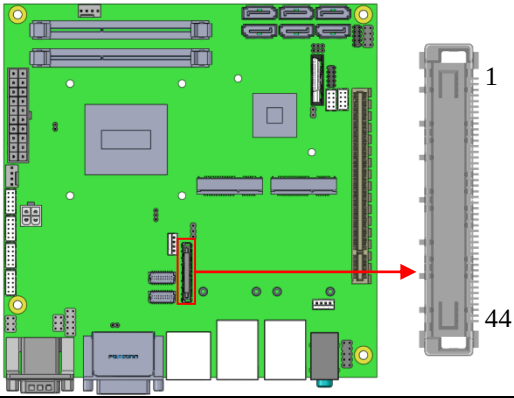
**CN5: USB2 #6/#7**

**CN6: Gigabit LAN (I217) + USB3 #0/#1**

**CN7, CN8: SATA3 Connectors**

**CN9: Gigabit LAN (I211) + USB3 #2/#3**

## CN3: eDP Connector (JAE_FI-TD44SB-E-R750)




| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| 3.3V | 1 | 23 | TXN0 |
| 3.3V | 2 | 24 | TXP0 |
| 3.3V | 3 | 25 | GND |
| 3.3V | 4 | 26 | AUXP |
| 3.3V | 5 | 27 | AUXN |
| GND | 6 | 28 | NC |
| GND | 7 | 29 | VCC3 |
| GND | 8 | 30 | NC |
| GND | 9 | 31 | VCC12 |
| HPD | 10 | 32 | NC |
| NC | 11 | 33 | GND |
| NC | 12 | 34 | VCC5 |
| GND | 13 | 35 | NC |
| NC | 14 | 36 | Brightness |
| NC | 15 | 37 | BKLT_EN |
| GND | 16 | 38 | VCC12 |
| NC | 17 | 39 | VCC3 |
| NC | 18 | 40 | GND |
| GND | 19 | 41 | SMB_THRM_CLK |
| TXN1 | 20 | 42 | SMB_THRM_DATA |
| TXP1 | 21 | 43 | NC |
| GND | 22 | 44 | NC |

### CN10: SATA2 Connector

### CN11: SATA2 Connectors

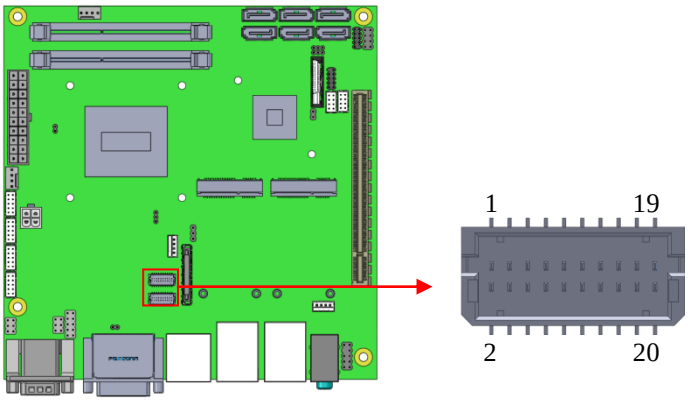
### CN12: HD Audio Connector

### CN13: SATA3 Connector

### CN14: SATA3 Connector support

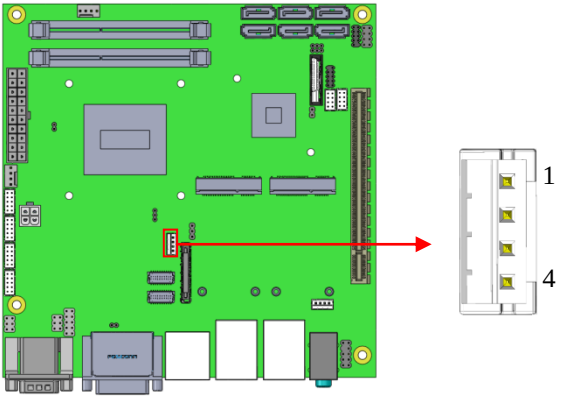
### JP3, JP4: LVDS Connectors (LVDS2, LVDS1) Hirose DF20G-20DP-1V

The LVDS connectors on board consist of the first channel (LVDS1) and second channel (LVDS2).



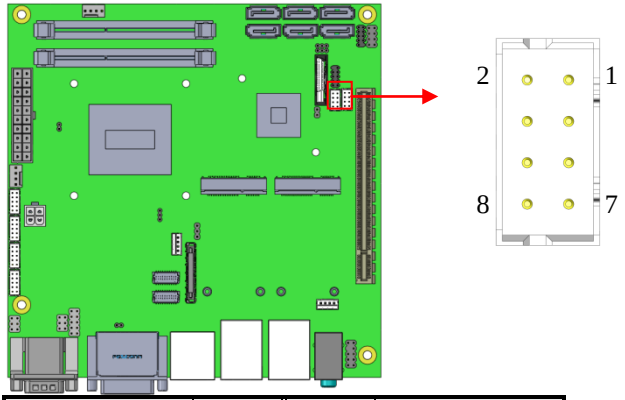

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| TX0N | 2 | 1 | TX0P |
| Ground | 4 | 3 | Ground |
| TX1N | 6 | 5 | TX1P |
| Ground | 8 | 7 | Ground |
| TX2N | 10 | 9 | TX2P |
| Ground | 12 | 11 | Ground |
| CLKN | 14 | 13 | CLKP |
| Ground | 16 | 15 | Ground |
| TX3N | 18 | 17 | TX3P |
| Power | 20 | 19 | Power |

### JP5: LCD Backlight Connector



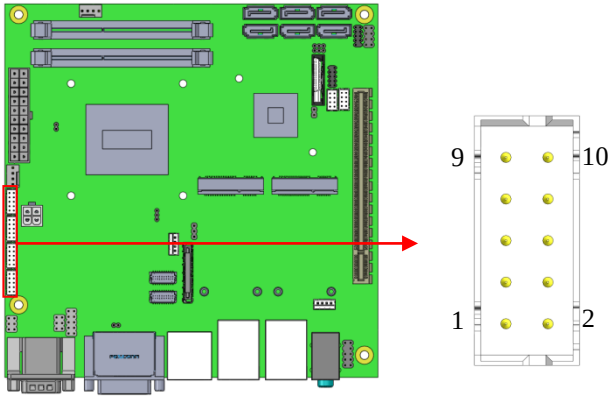

| Pin # | Signal Name |
|---|---|
| 1 | +12V |
| 2 | Backlight Enable |
| 3 | Brightness Control |
| 4 | Ground |

### JP6, JP8: USB2 #8/#9, USB2 #4/#5 Connectors



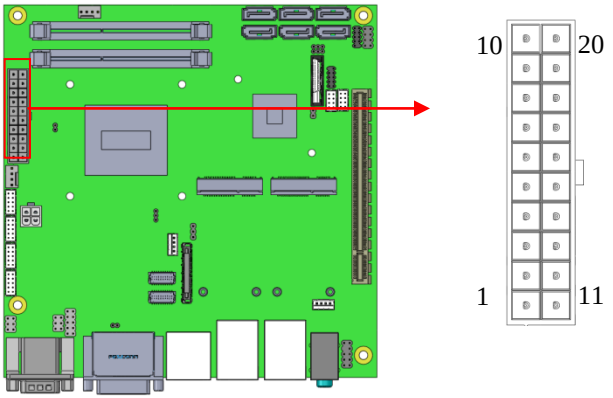

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| Vcc | 1 | 2 | Ground |
| D0- | 3 | 4 | D1+ |
| D0+ | 5 | 6 | D1- |
| Ground | 7 | 8 | Vcc |

### J1, J2, J3, J4: COM6, COM5, COM3, COM4 RS232 Serial Ports (HIROSE DF11-10DP-2DSA)



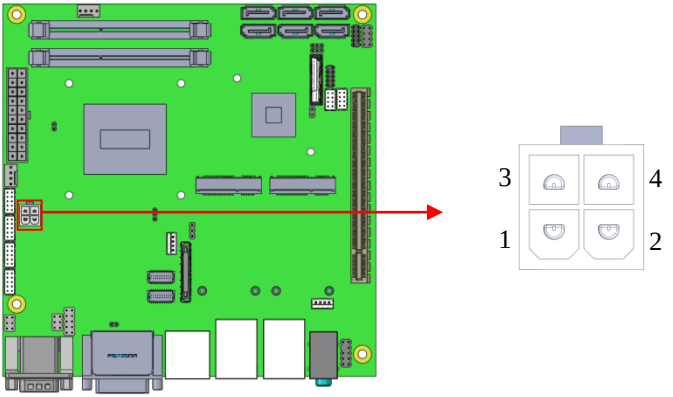

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| DCD# | 1 | 2 | SIN# |
| SOUT | 3 | 4 | DTR# |
| GND | 5 | 6 | DSR# |
| RTS# | 7 | 8 | CTS# |
| RI# | 9 | X | KEY |

### J5: ATX Power Supply Connector



| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| 3.3V | 11 | 1 | 3.3V |
| -12V | 12 | 2 | 3.3V |
| Ground | 13 | 3 | Ground |
| PS-ON | 14 | 4 | +5V |
| Ground | 15 | 5 | Ground |
| Ground | 16 | 6 | +5V |
| Ground | 17 | 7 | Ground |
| -5V | 18 | 8 | Power good |
| +5V | 19 | 9 | 5VSB |
| +5V | 20 | 10 | +12V |

### J6: ATX 12V Power Connector



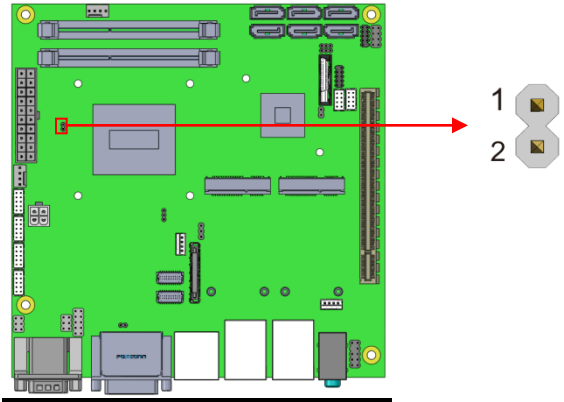

This connector supplies the CPU operating voltage.

| Pin # | Signal Name |
|---|---|
| 1 | Ground |
| 2 | Ground |
| 3 | +12V |
| 4 | +12V |

### JP7: LPC debug Connector (Factory use only)

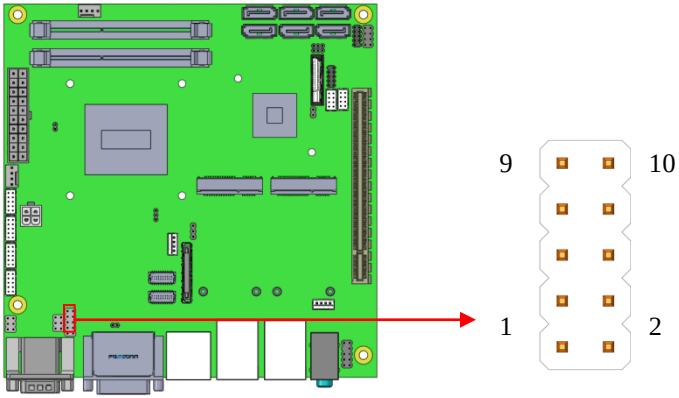
### JP9: SPI Flash Connector (Factory use only)

### J7: PCIE1 Configuration




| J7 | PCIE1 Configuration |
|---|---|
| Open | PCIE X16 (Default) |
| Short | PCIE X8, X8 |

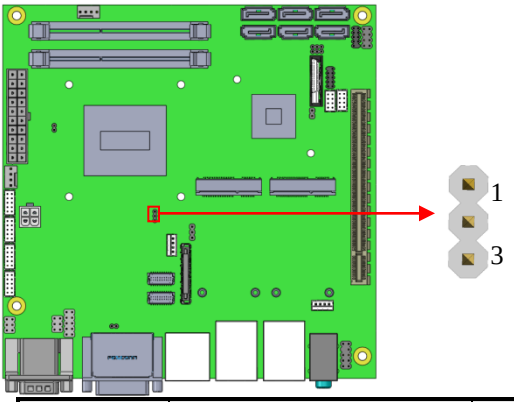
### J8: Digital I/O Connector (4 in, 4 out)




| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| Ground | 1 | 2 | +5V |
| Out3 | 3 | 4 | Out1 |
| Out2 | 5 | 6 | Out0 |
| IN3 | 7 | 8 | IN1 |
| IN2 | 9 | 10 | IN0 |

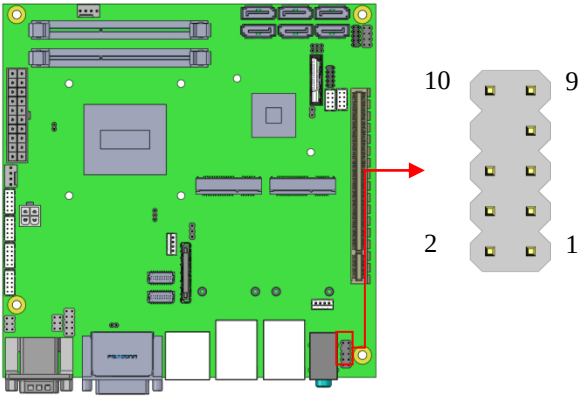
### J10, J11: DDR3 SO-DIMM Socket

## J12: LVDS/eDP Select



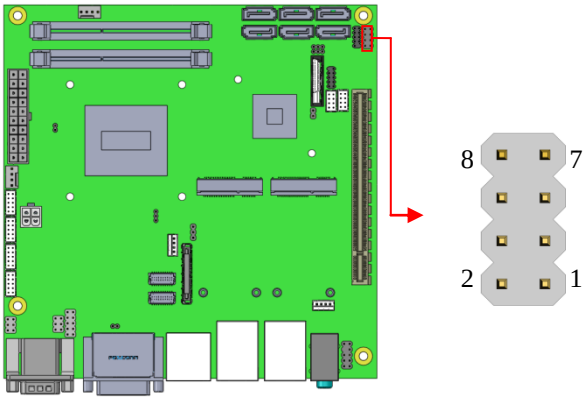

| J12 | Setting | Function |
|---|---|---|
| | Pin 1-2, Short/Closed | eDP Connector |
| | Pin 2-3, Short/Closed | LVDS |

## J21: Audio Pin Header for Chassis Front Panel



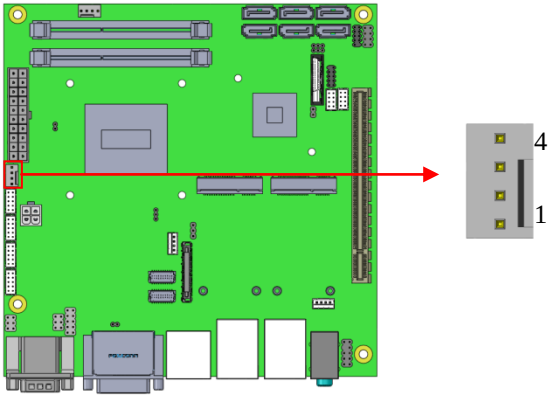

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| MIC IN_L | 1 | 2 | Ground |
| MIC IN_R | 3 | 4 | DET |
| LINE_R | 5 | 6 | Ground |
| Sense | 7 | 8 | KEY |
| LINE_L | 9 | 10 | Ground |

### J22: Front Panel



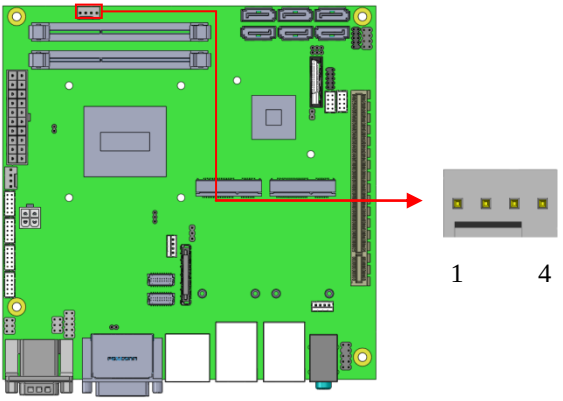

| Signal Name | Pin # | Pin # | Signal Name |
|---|---|---|---|
| Power BTN | 1 | 2 | Power BTN |
| HDD LED+ | 3 | 4 | HDD LED- |
| Reset BTN | 5 | 6 | Reset BTN |
| Power LED+ | 7 | 8 | Power LED- |

### CPU_FAN1: CPU Fan Power Connector




| Pin # | Signal Name |
|---|---|
| 1 | Ground |
| 2 | +12V |
| 3 | Rotation detection |
| 4 | Control |

### SYS_FAN2: System Fan Power Connector (DC/PWM Auto-Detect)




| Pin # | Signal Name |
|---|---|
| 1 | Ground |
| 2 | +12V |
| 3 | Rotation detection |
| 4 | Control |

### J14: Mini PCIE/mSATA (share with CN7) Connector

### J15: Mini PCIE Connector

# BIOS Setup

This chapter describes the different settings available in the AMI BIOS that comes with the board. The topics covered in this chapter are as follows:

BIOS Introduction ..... 26
BIOS Setup ..... 26
Advanced Settings ..... 28
Chipset Settings ..... 40
Boot Settings. ..... 47
CSM parameters ..... 48
Security Settings ..... 49
Save & Exit Settings ..... 50

## BIOS Introduction

The BIOS (Basic Input/Output System) installed in your computer system's ROM supports Intel processors. The BIOS provides critical low-level support for a standard device such as disk drives, serial ports and parallel ports. It also password protection as well as special support for detailed fine-tuning of the chipset controlling the entire system.

## BIOS Setup

The BIOS provides a Setup utility program for specifying the system configurations and settings. The BIOS ROM of the system stores the Setup utility. When you turn on the computer, the BIOS is immediately activated. Pressing the <Del> key immediately allows you to enter the Setup utility. If you are a little bit late pressing the <Del> key, POST (Power On Self Test) will continue with its test routines, thus preventing you from invoking the Setup. If you still wish to enter Setup, restart the system by pressing the "Reset" button or simultaneously pressing the <Ctrl>, <Alt> and <Delete> keys. You can also restart by turning the system Off and back On again. The following message will appear on the screen:

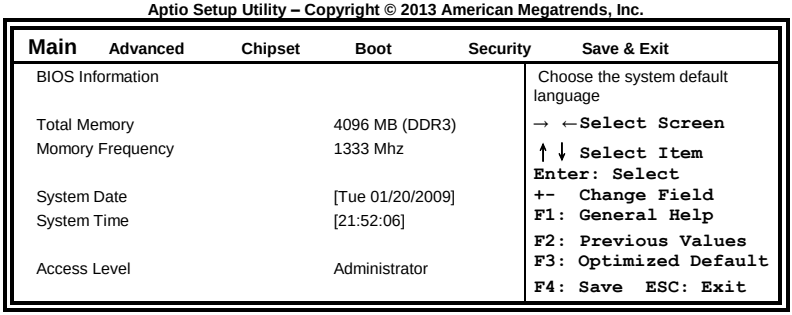
```
Press  <DEL>  to  Enter  Setup
```

In general, you press the arrow keys to highlight items, <Enter> to select, the <PgUp> and <PgDn> keys to change entries, <F1> for help and <Esc> to quit.

When you enter the Setup utility, the Main Menu screen will appear on the screen. The Main Menu allows you to select from various setup functions and exit choices.

***Warning:*** *It is strongly recommended that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your system manufacturer to provide the absolute maximum performance and reliability. Changing the defaults could cause the system to become unstable and crash in some cases.*

## Main Settings




### System Date

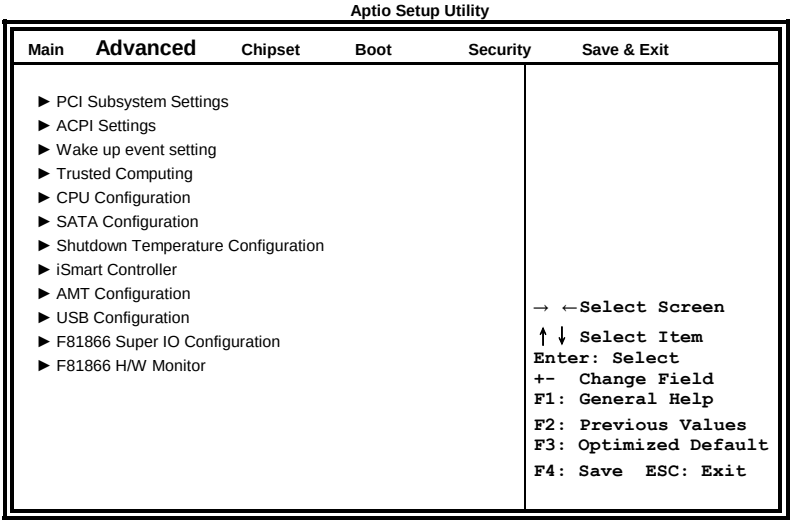
Set the Date. Use Tab to switch between Data elements.

### System Time

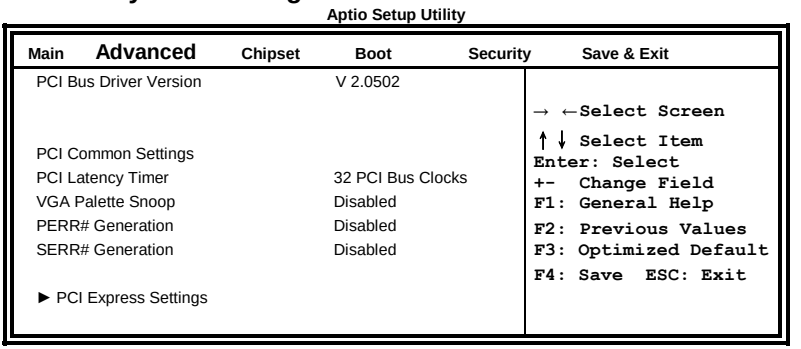
Set the Time. Use Tab to switch between Data elements.

## Advanced Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.




### PCI Subsystem Settings



### PCI Latency Timer
Value to be programmed into PCI Latency Timer Register.

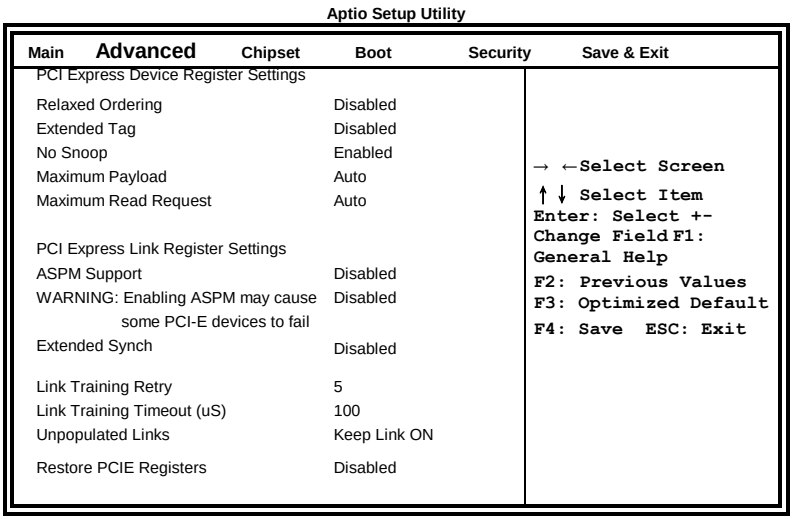
### VGA Palette Snoop
Enables or disables VGA Palette Registers Snooping.

### PERR# Generation
Enables or disables PCI device to generate PERR#.

### SERR# Generation
Enables or disables PCI device to generate SERR#.

### PCI Express Settings
Change PCI Express devices settings.

### PCI Express Settings


Aptio Setup Utility
Main Advanced Chipset Boot Security Save & Exit
PCI Express Device Register Settings
Relaxed Ordering Disabled
Extended Tag Disabled
No Snoop Enabled
Maximum Payload Auto
Maximum Read Request Auto
PCI Express Link Register Settings
ASPM Support Disabled
WARNING: Enabling ASPM may cause some PCI-E devices to fail Disabled
Extended Synch Disabled
Link Training Retry 5
Link Training Timeout (uS) 100
Unpopulated Links Keep Link ON
Restore PCIE Registers Disabled
→ ←Select Screen
↑↓ Select Item
Enter: Select +- Change Field F1: General Help
F2: Previous Values
F3: Optimized Default
F4: Save ESC: Exit

### Relaxed Ordering
Enables or disables PCI Express Device Relaxed Ordering.

### Extended Tag
If ENABLED allows device to use 8-bit Tag field as a requester.

### No Snoop
Enables or disables PCI Express Device No Snoop option.

### Maximum Payload
Set Maximum Payload of PCI Express Device or allow System BIOS to select the value.

### Maximum Read Request
Set Maximum Read Request Size of PCI Express Device or allow System BIOS to select the value.

### ASPM Support
Set the ASPM Level: Force L0s – Force all links to L0s State:
AUTO – BIOS auto configure: DISABLE – Disables ASPM.

### Extended Synch
If ENABLED allows generation of Extended Synchronization patterns.

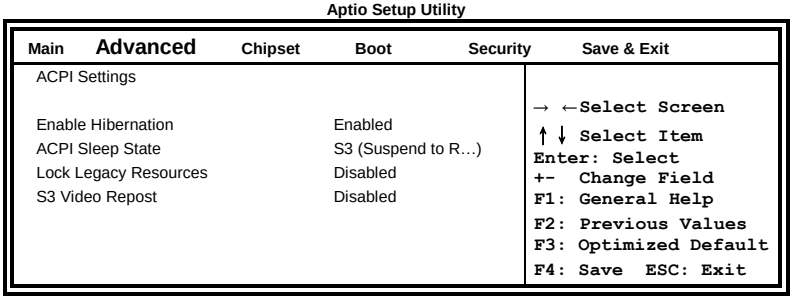
### Link Training Retry
Defines number of Retry Attempts software will take to retrain the link if previous training attempt was unsuccessful.

### Link Training Timeout (uS)
Defines number of Microseconds software will wait before polling 'Link Training' bit in Link Status register. Value range from 10 to 1000 uS.

### Unpopulated Links
In order to save power, software will disable unpopulated PCI Express links, if this option set to 'Disable Link'.

### Restore PCIE Registers
On non-PCI Express aware OS's (Pre Windows Vista) some devices may not be correctly reinitialized after S3.Enabling this restore PCI Express device configuration on S3 resume
Warning: Enabling this may cause issues with other hardware after S3 resume.

## ACPI Settings




### Enable Hibernation

Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

### ACPI Sleep State

Select ACPI sleep state the system will enter, when the *SUSPEND* button is pressed.

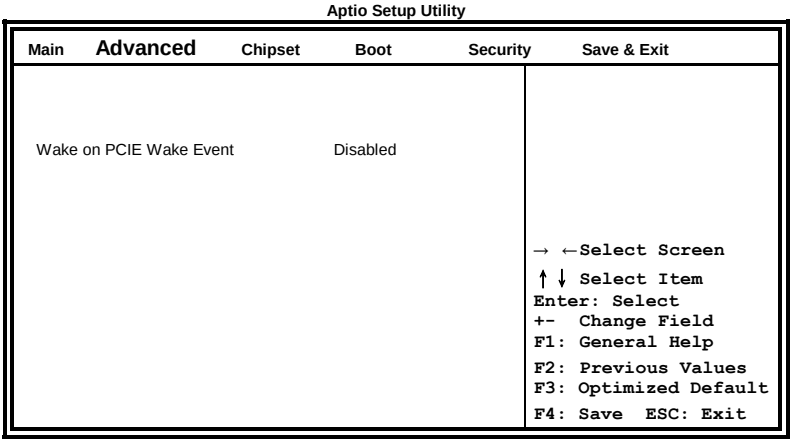
### Lock Legacy Resources

Enabled or Disabled Lock of Legacy Resources.

### S3 Video Repost

Enable or disable S3 Video Repost.

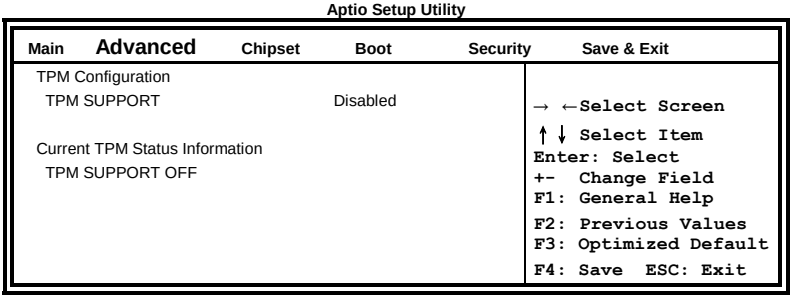
## Wake up event settings




### Wake on PCIE PME Wake Event

The options are Disabled and Enabled.

## Trusted Computing




### TPM Support

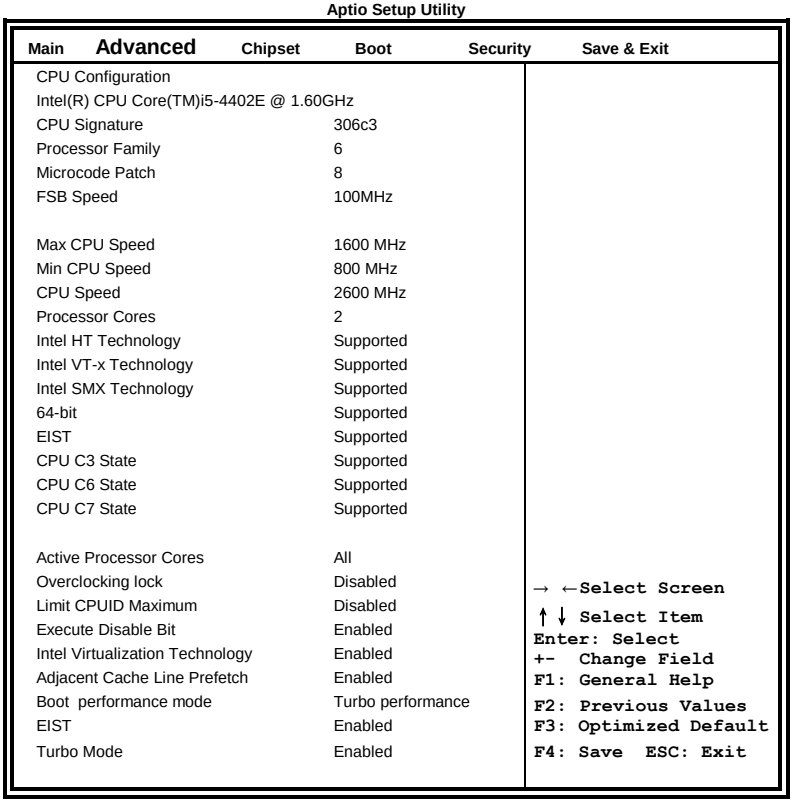
Enables or Disables TPM support. O.S. will not show TPM. Reset of platform is required.

### Security Device Support

Enables or disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

## CPU Configuration

This section shows the CPU configuration parameters.




### Active Processor Cores

Number of cores to enable in each processor package.

### Overclocking lock

Flex_RATIO(194)MSR

### Limit CPUID Maximum

Disabled for Windows XP.

### Execute Disable Bit

XD can prevent certain classes of malicious buffer overflow attacks when combined with a supporting OS

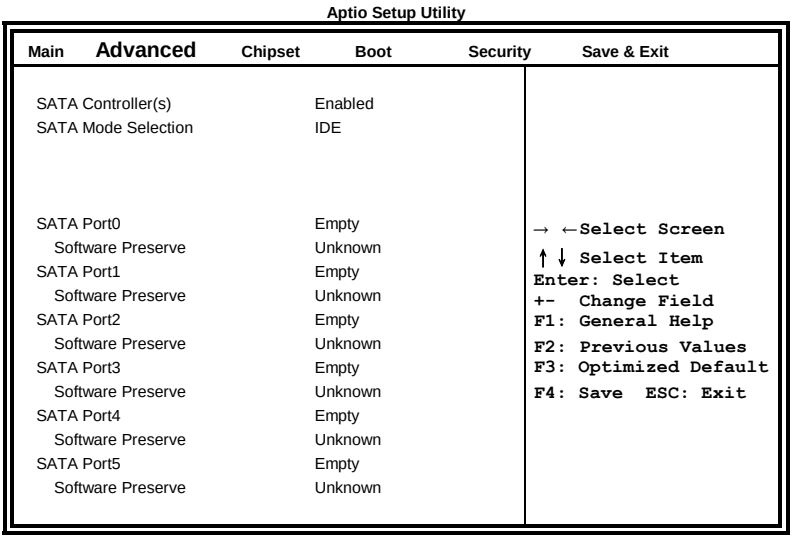
### Intel Virtualization Technology
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

### Adjacent Cache Line Prefetch
To turn on/off prefetching of adjacent cache lines.

### Boot Performance Mode
Select the performance state that the BIOS will set before OS handoff.

### EIST
Enabled/Disabled Intel Speedstep.

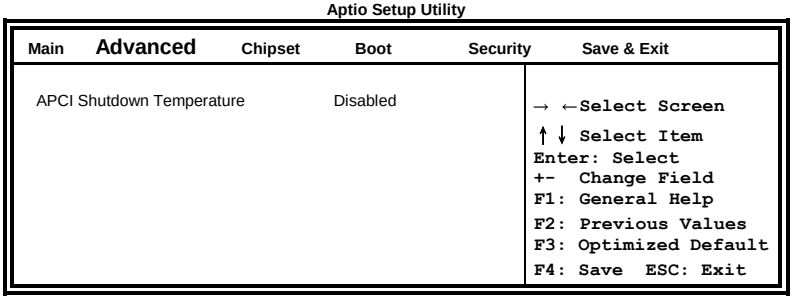
### SATA Configuration
SATA Devices Configuration.




### SATA Controller(s)
Enable / Disable Serial ATA Controller.

### SATA Mode Selection
(1) IDE Mode.
(2) AHCI Mode.
(3) RAID Mode.

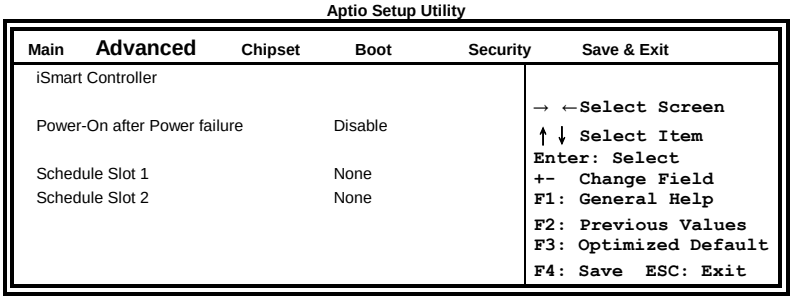
## Shutdown Temperature Configuration




### ACPI Shutdown Temperature

The default setting is Disabled.

## iSmart Controller



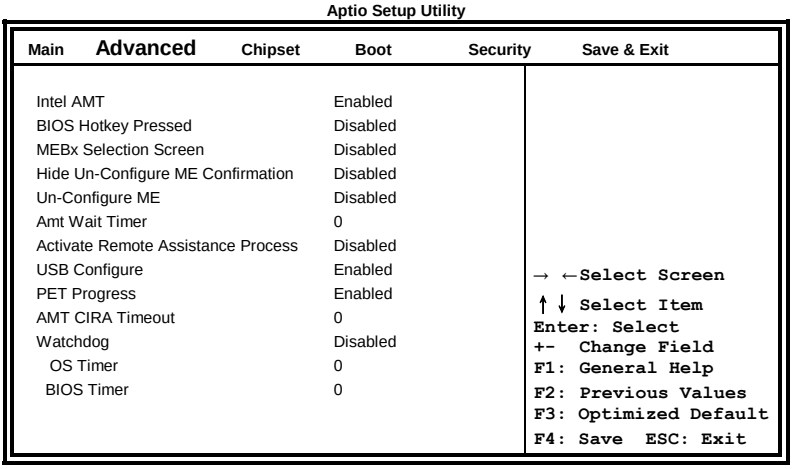

### iSmart Controller

Setup the power on time for the system.

### Schedule Slot 1 / 2

Setup the hour/minute for system power on.

## AMT Configuration




### AMT Configuration
Options are Enabled and Disabled.
Note: iAMT H/W is always enabled. This option just controls the BIOS extension execution. If enabled, this requires additional firmware in the SPI device.

### Unconfigure ME
Perform AMT/ME unconfigure without password operation.

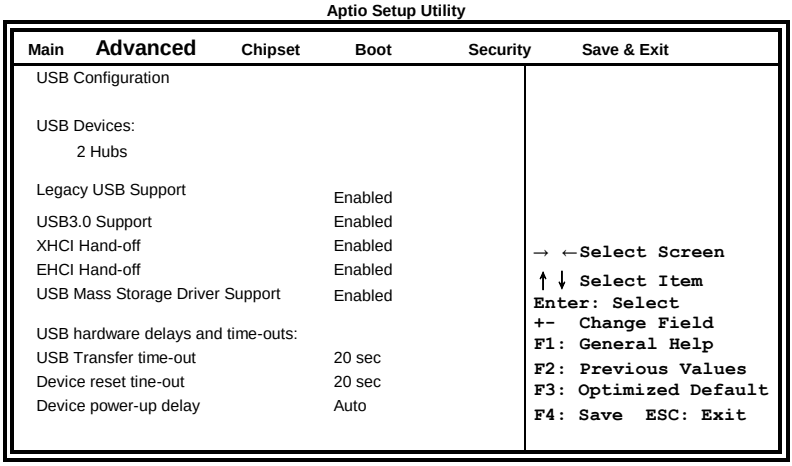
### Amt Wait Timer
Set timer to wait before sending ASF_GET_BOOT_OPTIONS.

### Activate Remote Assistance Process
Trigger CIRA boot.

### PET Progress
User can Enable/Disable PET Events progress to receive PET events or not.

### Watchdog Timer
Enable/Disable Watchdog Timer.

## USB Configuration




### Legacy USB Support

Enables Legacy USB support.
AUTO option disables legacy support if no USB devices are connected.
DISABLE option will keep USB devices available only for EFI applications.

### USB3.0 Support

Enable/Disable USB3.0 (XHCI) Controller support.

### XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

### EHCI Hand-off

Enabled/Disabled. This is a workaround for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

### USB Mass Storage Driver Support

Enable/Disable USB Mass Storage Driver Support.

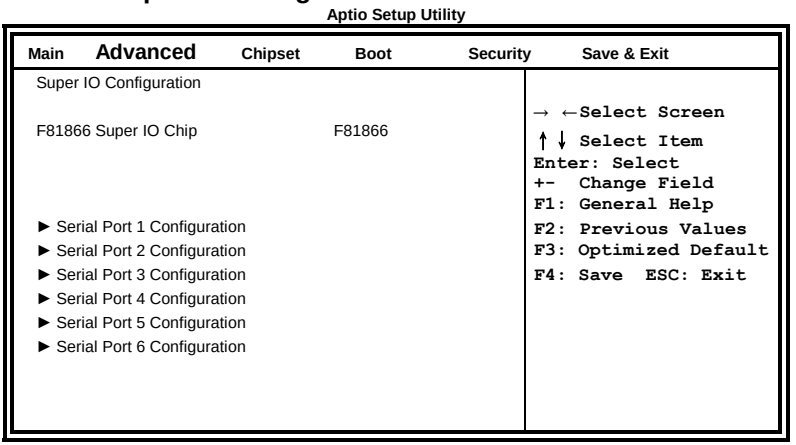
### USB Transfer time-out

The time-out value for Control, Bulk, and Interrupt transfers.

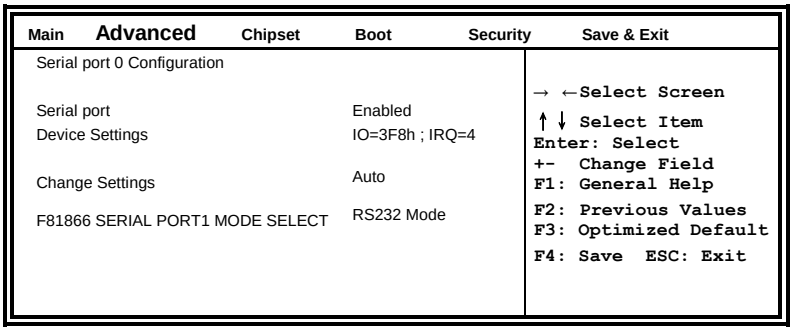
### Device reset tine-out
USB mass Storage device start Unit command time-out.

### Device power-up delay
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken from Hub descriptor.

### F81866 Super IO Configuration



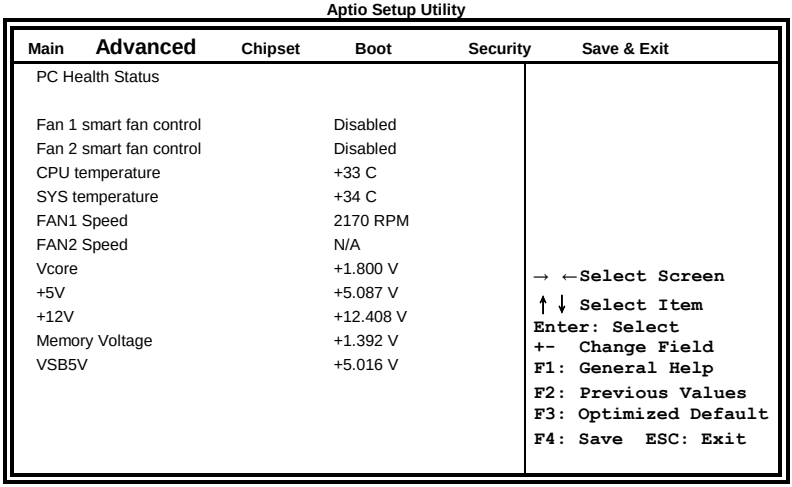

### Serial Port Configuration
Set Parameters of Serial Ports. User can Enable/Disable the serial port and Select an optimal settings for the Super IO Device.




## F81866 SERIAL PORT1 MODE SELECT

For RS232/RS422/RS485 mode select

## F81866 H/W Monitor




### Temperatures/Voltages

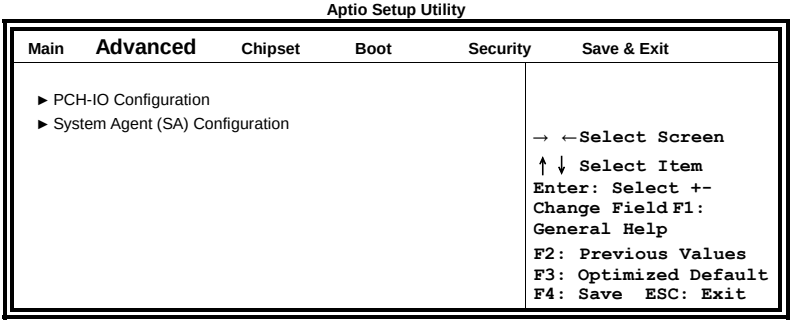
These fields are the parameters of the hardware monitoring function feature of the motherboard. The values are read-only values as monitored by the system and show the PC health status.

### Fan1/Fan2 Smart Fan Control

This field enables or disables the smart fan feature. At a certain temperature, the fan starts turning. Once the temperature drops to a certain level, it stops turning again.

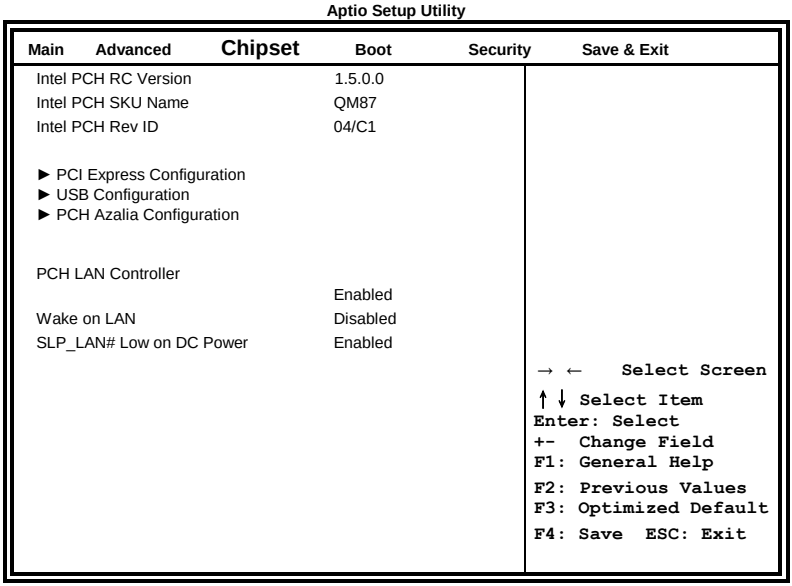
## Chipset Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.



## PCH-IO Configuration

This section allows you to configure the North Bridge Chipset.




### PCH LAN Controller

Enable or disable onboard NIC.

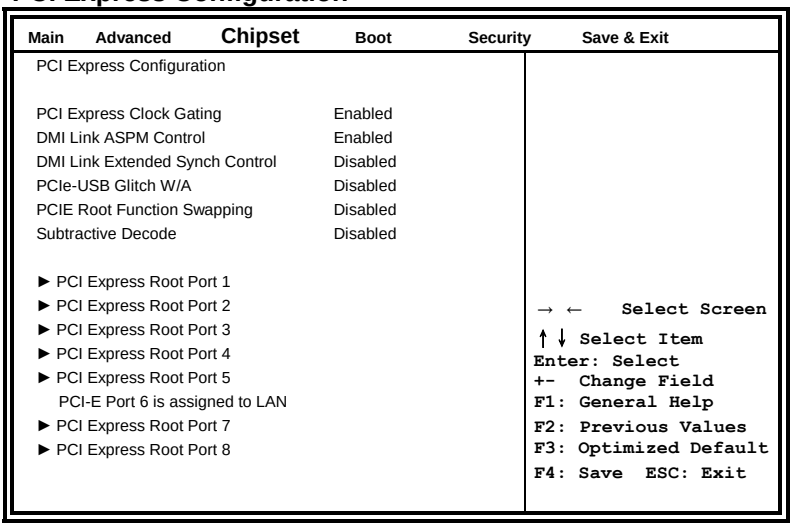
### Wake on LAN

Enable or disable integrated LAN to wake the system. (The Wake On LAN cannot be disabled if ME is on at Sx state.)

### SLP_LAN# Low on DC Power

Enable or Disable SLP_LAN# Low on DC Power

## PCI Express Configuration


Main Advanced Chipset Boot Security Save & Exit
PCI Express Configuration
PCI Express Clock Gating Enabled
DMI Link ASPM Control Enabled
DMI Link Extended Synch Control Disabled
PCIe-USB Glitch W/A Disabled
PCIE Root Function Swapping Disabled
Subtractive Decode Disabled
► PCI Express Root Port 1
► PCI Express Root Port 2
► PCI Express Root Port 3
► PCI Express Root Port 4
► PCI Express Root Port 5
PCI-E Port 6 is assigned to LAN
► PCI Express Root Port 7
► PCI Express Root Port 8
→ ← Select Screen
↑ ↓ Select Item
Enter: Select
+- Change Field
F1: General Help
F2: Previous Values
F3: Optimized Default
F4: Save ESC: Exit

### PCI Express Clock Gating

Enable or disable PCI Express Clock Gating for each root port.

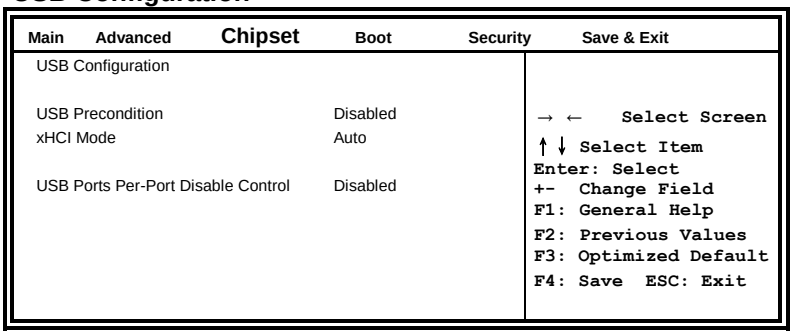
### DMI Link ASPM Control

The control of Active State Power Management on both NB side and SB side of the DMI link.

### PCIe-USB Glitch W/A

PCIe-USB Glitch W/A for bad USB device(s) connected behind PCIE/PEG port.

## USB Configuration




### USB Precondition

Precondition work on USB host controller and root ports for faster enumeration.

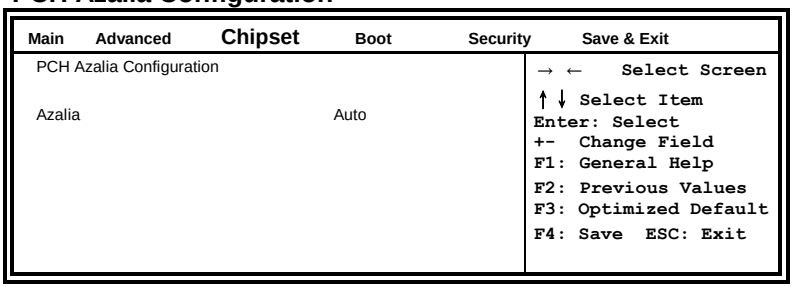
### xHCI Mode

Mode of operation of xHCI controller.

### USB Ports Per-Port Disable Control

Control each of the USB ports (0~13) disabling.

## PCH Azalia Configuration




### Azalia

Control Detection of the Azalia device.
Disabled = Azalia will be unconditionally be disabled.
Enabled = Azalia will be unconditionally be enabled.
Auto = Azalia will be enabled if present, disabled otherwise.

## System Agent (SA) Configuration

Aptio Setup Utility

| Main | Advanced | Chipset | Boot | Security | Save & Exit |
|---|---|---|---|---|---|
| System Agent Bridge Name | | | Haswell | | |
| System Agent RC Version | | | 1.5.0.0 | | |
| VT-d Capability | | | Supported | | |
| VT-d | | | Enabled | | |
| CHAP Device (B0:D7:F0) | | | Disabled | | |
| Thermal Device (B0:D4:F0) | | | Disabled | | |
| CPU SA Audio Device (B0:D3:F0) | | | Enabled | | |
| Enable NB CRID | | | Disabled | | |
| BDAT ACPI Table Support | | | Disabled | | |
| ► Graphics Configuration | | | | | |
| ► Memory Configuration | | | | | |

→ ←Select Screen
↑ ↓ Select Item
Enter: Select
+- Change Field
F1: General Help
F2: Previous Values
F3: Optimized Default
F4: Save ESC: Exit

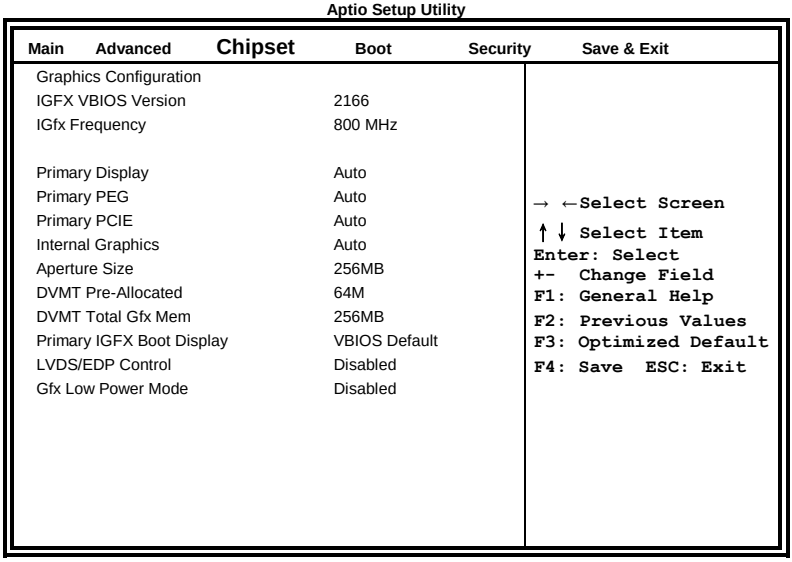
### VT-d

Check to enable VT-d function on MCH.

### Enable NB CRID

Enable or disable NB CRID WorkAround.

## Graphics Configuration




### Primary Display

Select which of IGFX/PEG/PCI graphics device should be primary display or select SG for switchable Gfx.

### Primary PEG

Select PEGO/PEG1/PEG2/PEG3 Graphics device should be Primary PEG.

### Primary PCIE

Select PCIE0/PCIE1/PCIE2/PCIE3/PCIE4/PCIE5/PCIE6PCIE7 Graphics device should be primary PCIE.

### Internal Graphics

Keep IGD enabled based on the setup options.

### DVMT Pre-Allocated

Select DVMT 5.0 Pre-Allocated (Fixed) graphics memory size used by the internal graphics device.

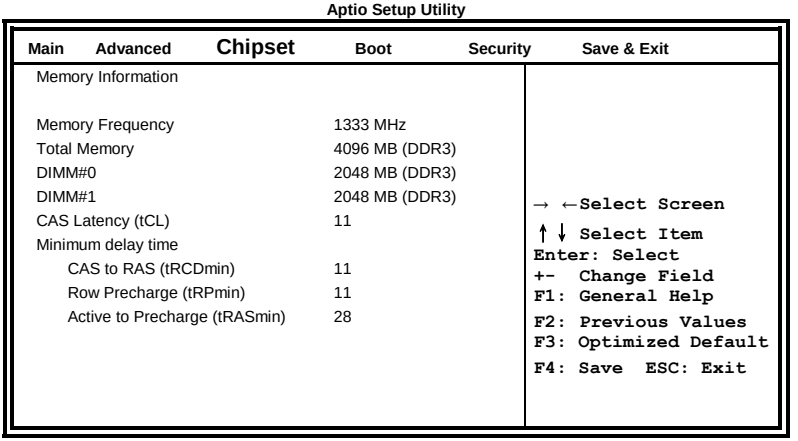
### DVMT Total Gfx Mem
Select DVMT 5.0 total graphics memory size used by the internal graphics device.

### Primary IGFX Boot Display
Select the Video Device that will be activated during POST. This has no effect if external graphics present. Secondary booty display selection will appear based on your selection. VGA modes will be supported only on primary display.

### LVDS/EDP Control
LVDS/EDP Control

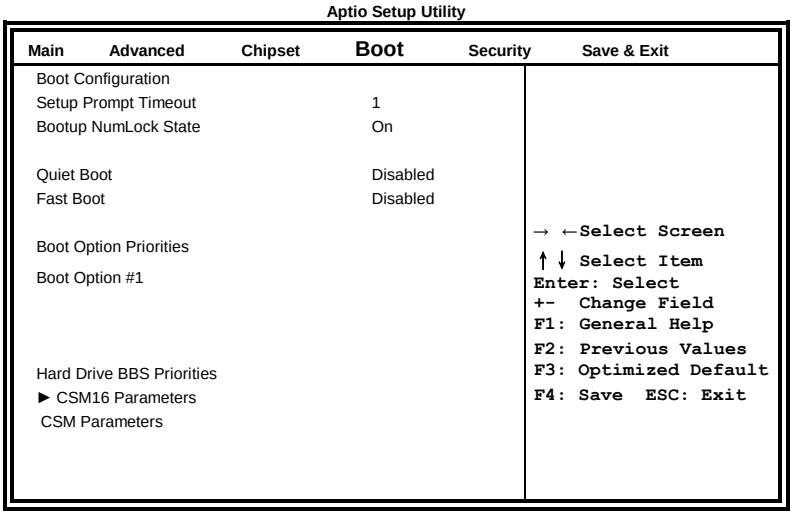
### Gfx Low Power Mode
This option is applicable for SFF only.

### Memory Configuration



## Boot Settings

This section allows you to configure the boot settings.




### Setup Prompt Timeout

Number of seconds to wait for setup activation key.
65535(0xFFFF) means indefinite waiting.

### Bootup NumLock State

Select the keyboard NumLock state.

### Quiet Boot

Enables/Disables Quiet Boot option.

### Fast Boot

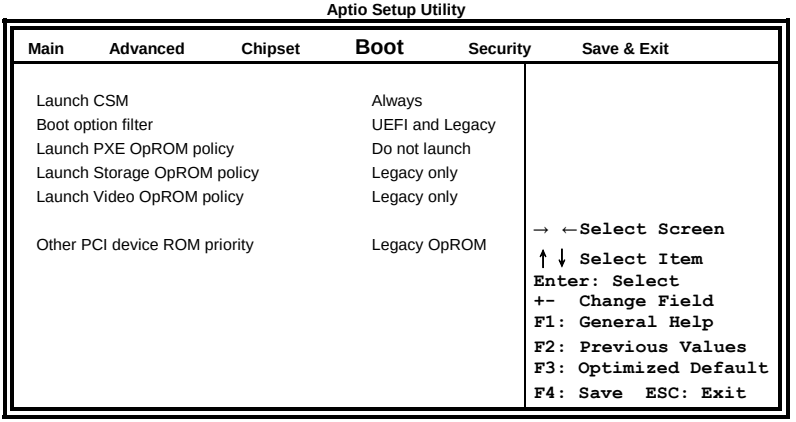
Enables/Disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.

### Boot Option Priorities

Sets the system boot order.

## CSM parameters

This section allows you to configure the boot settings.


Aptio Setup Utility
Main Advanced Chipset Boot Security Save & Exit
Launch CSM Always
Boot option filter UEFI and Legacy
Launch PXE OpROM policy Do not launch
Launch Storage OpROM policy Legacy only
Launch Video OpROM policy Legacy only
Other PCI device ROM priority Legacy OpROM
→ ←Select Screen
↑ ↓ Select Item
Enter: Select
+- Change Field
F1: General Help
F2: Previous Values
F3: Optimized Default
F4: Save ESC: Exit

### Boot Option Filter

This option controls what devices system can boot to.

### Launch PXE OpROM Policy

Controls the execution of UEFI and Legacy PXE OpROM.

### Launch Storatge OpROM Policy

Controls the execution of UEFI and Legacy Storage OpROM.

### Launch Video OpROM Policy

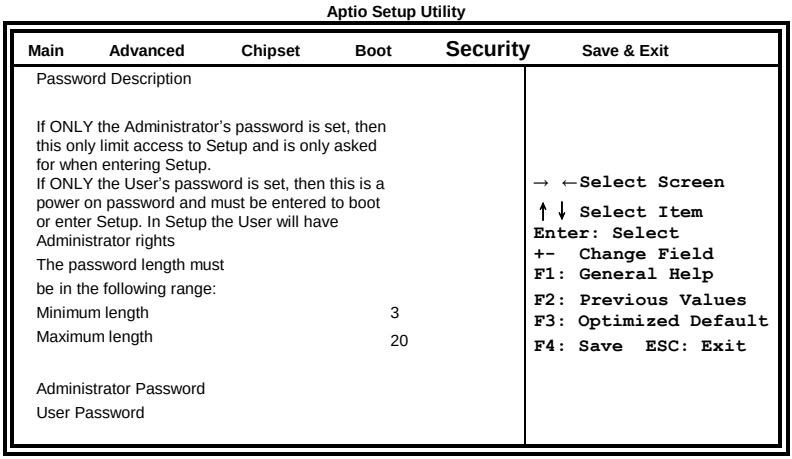
Controls the execution of UEFI and Legacy Video OpROM.

### Other PCI Device ROM Priority

For PCI devices other than Network, Mass storage or Video defines which OpROM to launch.

## Security Settings

This section allows you to configure and improve your system and allows you to set up some system features according to your preference.


Aptio Setup Utility
Main
Advanced
Chipset
Boot
Security
Save & Exit
Password Description
If ONLY the Administrator's password is set, then this only limit access to Setup and is only asked for when entering Setup.
If ONLY the User's password is set, then this is a power on password and must be entered to boot or enter Setup. In Setup the User will have Administrator rights
The password length must
be in the following range:
Minimum length
3
Maximum length
20
Administrator Password
User Password
→ ←Select Screen
↑ ↓ Select Item
Enter: Select
+- Change Field
F1: General Help
F2: Previous Values
F3: Optimized Default
F4: Save ESC: Exit

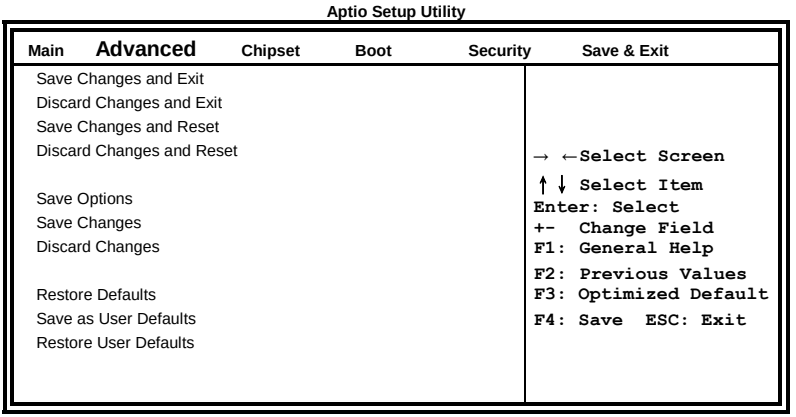
### Administrator Password

Set Setup Administrator Password.

### User Password

Set User Password.

## Save & Exit Settings




### Save Changes and Exit
Exit system setup after saving the changes.

### Discard Changes and Exit
Exit system setup without saving any changes.

### Save Changes and Reset
Reset the system after saving the changes.

### Discard Changes and Reset
Reset system setup without saving any changes.

### Save Changes
Save Changes done so far to any of the setup options.

### Discard Changes
Discard Changes done so far to any of the setup options.

### Restore Defaults
Restore/Load Defaults values for all the setup options.

### Save as User Defaults
Save the changes done so far as User Defaults.

### Restore User Defaults
Restore the User Defaults to all the setup options.

# Drivers Installation

This section describes the installation procedures for software and drivers. The software and drivers are included with the motherboard. If you find the items missing, please contact the vendor where you made the purchase. The contents of this section include the following:

Intel Chipset Software Installation Utility . ..... 52
VGA Drivers Installation..... 54
Realtek HD Audio Driver Installation . ..... 56
LAN Drivers Installation ..... 58
Intel® Management Engine Interface . ..... 61
Intel® USB 3.0 Drivers ..... 64

**IMPORTANT NOTE:**
After installing your Windows operating system, you must install first the Intel Chipset Software Installation Utility before proceeding with the drivers installation.

# Intel Chipset Software Installation Utility

The Intel Chipset Drivers should be installed first before the software drivers to enable Plug & Play INF support for Intel chipset components. Follow the instructions below to complete the installation.

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) 8 Series Chipset Drivers***.

2. Click ***Intel(R) Chipset Software Installation Utility.***

Inside This CD...
Version : 9.0.3i @1
Intel
LAN Card
Tools
Intel(R) Chipset Software Installation Utility
Intel(R) HD Graphics Driver
Realtek High Definition Audio Driver
Intel(R) PRO LAN Network Drivers
Intel(R) ME 9.0 Drivers
Intel(R) USB 3.0 Drivers
Update Windows OS with Plug and Play feature and allow the OS to correctly identify the Intel chipset components and properly configure the system.

3. When the Welcome screen to the Intel® Chipset Device Software appears, click ***Next*** to continue.

4. Click ***Yes*** to accept the software license agreement and proceed with the installation process.

5. On the Readme File Information screen, click ***Next*** to continue the installation.

Intel® Chipset Device Software
Intel® Chipset Device Software
Readme File Information
intel
Refer to the Readme file below to view the system requirements and installation information.
Press the Page Down key to view the rest of the file.
**********
* Product: Intel(R) Chipset Device Software
* Release: Beta
* Version: 9.4.0.1010
* Target PDH/Chipset: Haswell/LynxPoint/LynxPoint-LP
* Date: September 11 2012
**********
< Back
Next >
Cancel
Intel® Installation Framework

6. The Setup process is now complete. Click ***Finish*** to restart the computer and for changes to take effect.

# VGA Drivers Installation

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) 8 Series Chipset Drivers***.

2. Click ***Intel(R) Core(TM) i3/i5/i7 Graphics Driver.***

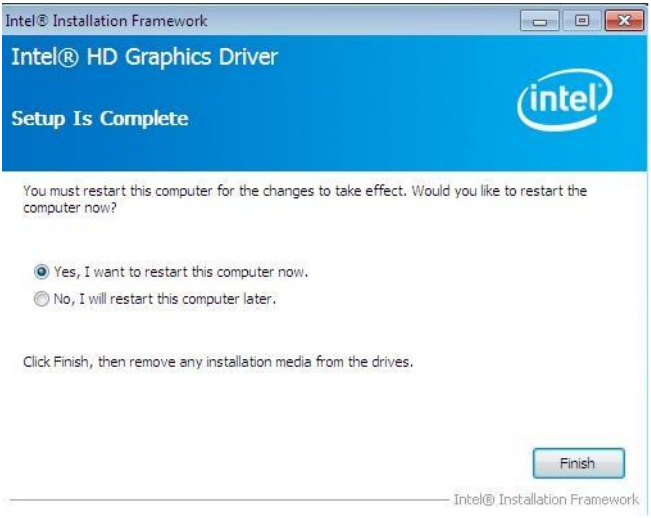
3. When the Welcome screen appears, click ***Next*** to continue.

4. Click ***Yes*** to to agree with the license agreement and continue the installation.

5. On the screen shown below, click ***Install*** to continue.

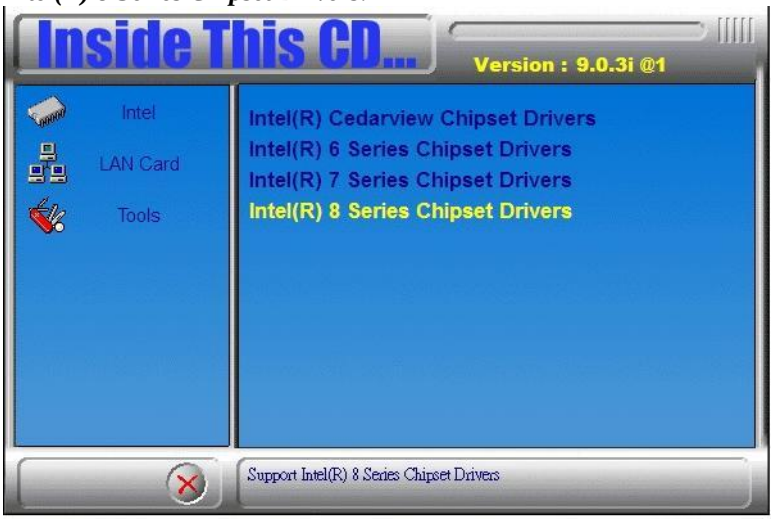
Windows Security
Would you like to install this device software?
Name: Intel Corporation Display adapters
Publisher: Intel Corporation - Software and Firmwar...
Always trust software from "Intel Corporation - Software and Firmwar...".
Install
Don't Install
You should only install driver software from publishers you trust. How can I decide which device software is safe to install?

6. Setup complete. Click ***Finish*** to restart the computer and for changes to take effect.


Intel® Installation Framework
Intel® HD Graphics Driver
Setup Is Complete
intel
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart this computer now.
No, I will restart this computer later.
Click Finish, then remove any installation media from the drives.
Finish
Intel® Installation Framework

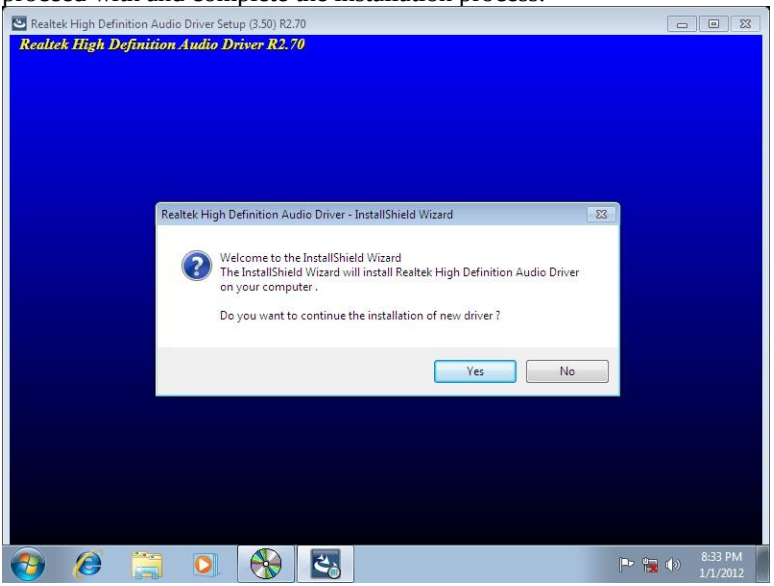
# Realtek HD Audio Driver Installation

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) 8 Series Chipset Drivers***.

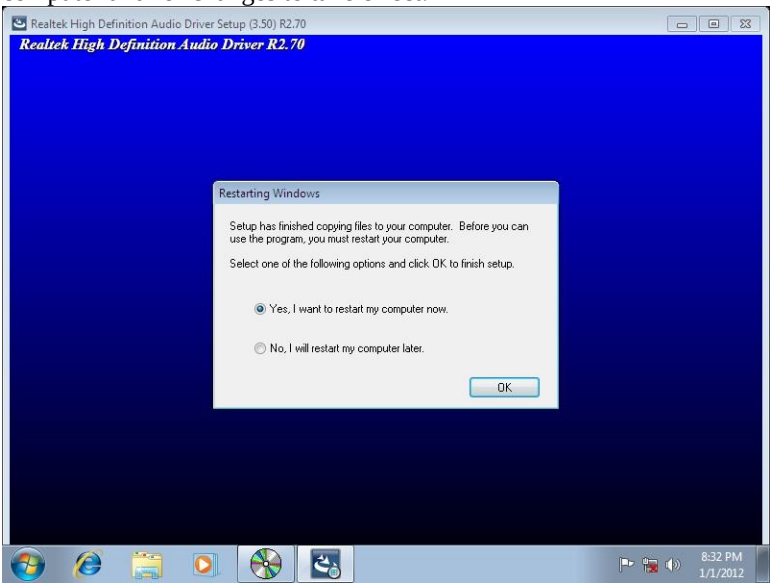



2. Click ***Realtek High Definition Audio Driver.***

3. On the Welcome to the InstallShield Wizard screen, click ***Yes*** to proceed with and complete the installation process.


Realtek High Definition Audio Driver Setup (3.50) R2.70
Realtek High Definition Audio Driver R2.70
Realtek High Definition Audio Driver - InstallShield Wizard
Welcome to the InstallShield Wizard
The InstallShield Wizard will install Realtek High Definition Audio Driver on your computer .
Do you want to continue the installation of new driver ?
Yes
No
8:33 PM
1/1/2012

4. The InstallShield Wizard Complete. Click ***Finish*** to restart the computer and for changes to take effect.

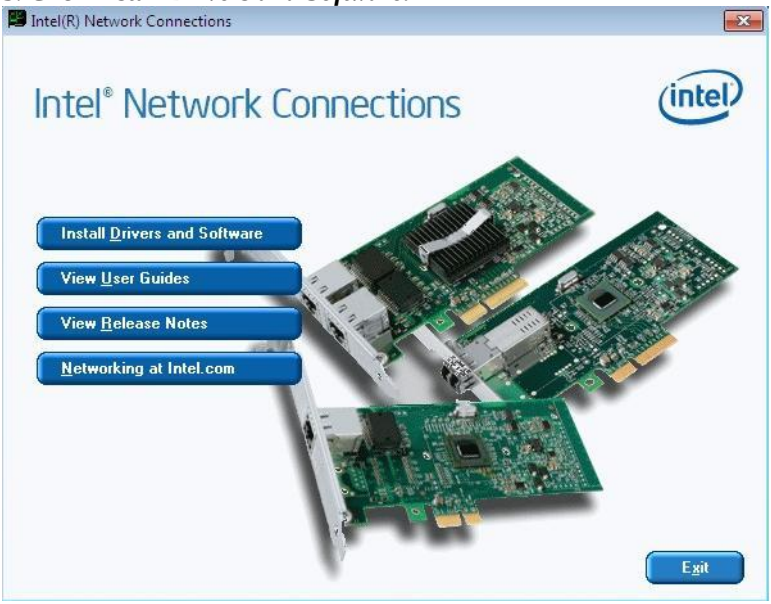

Realtek High Definition Audio Driver Setup (3.50) R2.70
Realtek High Definition Audio Driver R2.70
Restarting Windows
Setup has finished copying files to your computer. Before you can use the program, you must restart your computer.
Select one of the following options and click OK to finish setup.
Yes, I want to restart my computer now.
No, I will restart my computer later.
OK
8:32 PM
1/1/2012

# LAN Drivers Installation

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) 8 Series Chipset Drivers***.

2. Click ***Intel(R) PRO LAN Network Driver.***

3. Click ***Install Drivers and Software.***

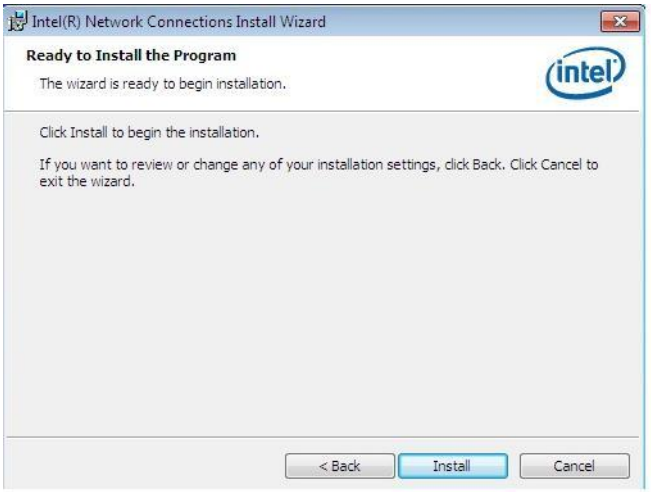



4. When the Welcome screen appears, click ***Next***.

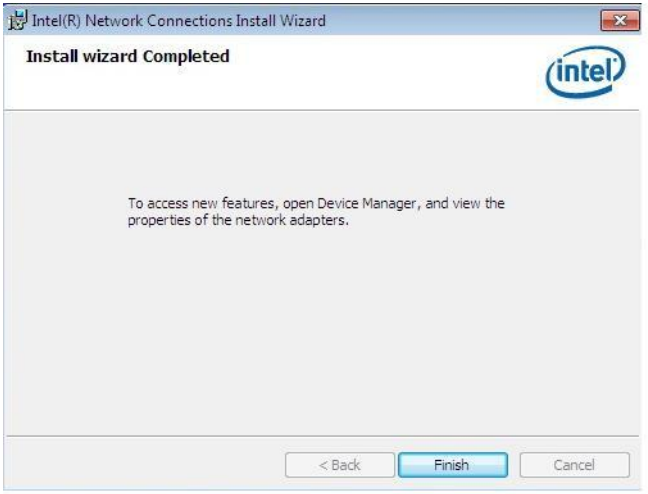
5. Click ***Next*** to to agree with the license agreement.

6. Click the checkbox for **Drivers** in the Setup Options screen to select it and click **Next** to continue.

7. The wizard is ready to begin installation. Click ***Install*** to begin the installation.


Intel(R) Network Connections Install Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
< Back
Install
Cancel

8. When InstallShield Wizard is complete, click ***Finish***.


Intel(R) Network Connections Install Wizard
Install wizard Completed
To access new features, open Device Manager, and view the properties of the network adapters.
< Back
Finish
Cancel

# Intel® Management Engine Interface

The following application requires Microsoft .NET Framework 3.5 or later: Intel® Management Engine Components. Please install the latest version of Microsoft .NET Framework from Microsoft Download Center to run this application correctly.

**Follow the steps below to install the Intel Management Engine.**

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) 8 Series Chipset Drivers*** and then ***Intel(R) AMT 9.0 Drivers***.

2. When the Welcome screen to the InstallShield Wizard for Intel® Management Engine Components, click the checkbox for **Install Intel® Control Center** & click ***Next***.

Intel® Installation Framework
Intel® Management Engine Components
Welcome to the Setup Program
intel
This setup program will install the Intel® Management Engine Components.
It is strongly recommended that you exit all programs before continuing. Click Next to continue.
Install Intel® Control Center
Intel® Control Center provides a centralized starting point for Intel applications making it easier to find the programs that you need.
< Back
Next >
Cancel
Intel® Installation Framework

3. Click ***Yes*** to to agree with the license agreement.

Intel® Installation Framework
Intel® Management Engine Components
License Agreement
intel
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
INTEL SOFTWARE LICENSE AGREEMENT (OEM / IHV / ISV Distribution & Single User)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
Please Also Note:
* If you are an Original Equipment Manufacturer (OEM), Independent Hardware Vendor (IHV), or Independent Software Vendor (ISV), this complete LICENSE AGREEMENT applies;
* If you are an End-User, then only Exhibit A, the INTEL SOFTWARE LICENSE AGREEMENT,
< Back
Yes
No
Intel® Installation Framework

4. When the Setup Progress screen appears, click ***Next***. Then, click ***Finish*** when the setup progress has been successfully installed.

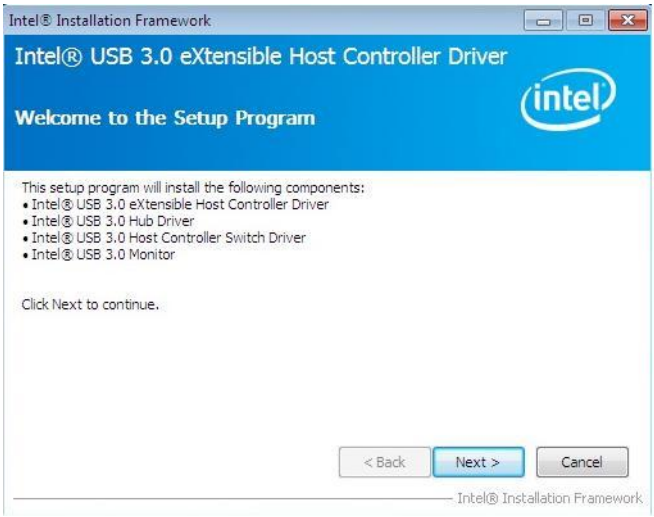
Intel® Installation Framework
Intel® Management Engine Components
Setup Is Complete
intel
The setup program successfully installed the following components:
- Intel® Management Engine Interface
- Intel® Dynamic Application Loader
- Intel® Identity Protection Technology (Intel® IPT)
- Serial Over LAN
- Intel® Management and Security Status
- Local Management Service
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart this computer now.
No, I will restart this computer later.
Click Finish, then remove any installation media from the drives.
Finish
Intel® Installation Framework

# Intel® USB 3.0 Drivers

1. Insert the DVD that comes with the board. Click ***Intel*** and then ***Intel(R) 8 Series Chipset Drivers***.

2. Click ***Intel(R) USB 3.0 Drivers.***

3. When the Welcome screen to the InstallShield Wizard for Intel® USB 3.0 eXtensible Host Controller Driver, click ***Next***.


Intel® Installation Framework
Intel® USB 3.0 eXtensible Host Controller Driver
Welcome to the Setup Program
intel
This setup program will install the following components:
• Intel® USB 3.0 eXtensible Host Controller Driver
• Intel® USB 3.0 Hub Driver
• Intel® USB 3.0 Host Controller Switch Driver
• Intel® USB 3.0 Monitor
Click Next to continue.
< Back
Next >
Cancel
Intel® Installation Framework

4. Click ***Yes*** to to agree with the license agreement and continue the installation.

Intel® Installation Framework
Intel® USB 3.0 eXtensible Host Controller Driver
License Agreement
intel
You must accept all of the terms of the license agreement in order to continue the setup program. Do you accept the terms?
INTEL SOFTWARE LICENSE AGREEMENT (Alpha / Beta, Organizational Use)
IMPORTANT - READ BEFORE COPYING, INSTALLING OR USING.
Do not use or load this software and any associated materials (collectively, the "Software") until you have carefully read the following terms and conditions. By loading or using the Software, you agree to the terms of this Agreement. If you do not wish to so agree, do not install or use the Software.
The Software contains pre-release "alpha" or "beta" code, which may not be fully functional and which Intel Corporation ("Intel") may substantially modify in producing any "final" version of the Software. Intel can provide no assurance that it will ever produce or make generally
< Back
Yes
No
Intel® Installation Framework

5. On the Readme File Information screen, click ***Next*** to continue the installation of the Intel® USB 3.0 eXtensible Host Controller Driver.

6. Setup complete. Click ***Finish*** to restart the computer and for changes to take effect.

Intel® Installation Framework
Intel® USB 3.0 eXtensible Host Controller Driver
Setup Is Complete
intel
You must restart this computer for the changes to take effect. Would you like to restart the computer now?
Yes, I want to restart this computer now.
No, I will restart this computer later.
Click Finish, then remove any installation media from the drives.
Finish
Intel® Installation Framework

# Appendix

## A. I/O Port Address Map

Each peripheral device in the system is assigned a set of I/O port addresses which also becomes the identity of the device. The following table lists the I/O port addresses used.

| Address | Device Description |
|---|---|
| 000h - 01Fh | DMA Controller #1 |
| 020h - 03Fh | Interrupt Controller #1 |
| 040h - 05Fh | Timer |
| 060h - 06Fh | Keyboard Controller |
| 070h - 07Fh | Real Time Clock, NMI |
| 080h - 09Fh | DMA Page Register |
| 0A0h - 0BFh | Interrupt Controller #2 |
| 0C0h - 0DFh | DMA Controller #2 |
| 0F0h | Clear Math Coprocessor Busy Signal |
| 0F1h | Reset Math Coprocessor |
| 1F0h - 1F7h | IDE Interface |
| 2F8h - 2FFh | Serial Port #2(COM2) |
| 2B0h- 2DFh | Graphics adapter Controller |
| 360h - 36Fh | Network Ports |
| 3F8h - 3FFh | Serial Port #1(COM1) |

# B. Interrupt Request Lines (IRQ)

Peripheral devices use interrupt request lines to notify CPU for the service required. The following table shows the IRQ used by the devices on board.

| Level | Function |
|---|---|
| IRQ0 | System Timer Output |
| IRQ1 | Keyboard |
| IRQ3 | Serial Port #2 |
| IRQ4 | Serial Port #1 |
| IRQ8 | Real Time Clock |
| IRQ14 | Primary IDE |
| IRQ15 | Secondary IDE |

# C. Watchdog Timer Configuration

The WDT is used to generate a variety of output signals after a user programmable count. The WDT is suitable for use in the prevention of system lock-up, such as when software becomes trapped in a deadlock. Under these sorts of circumstances, the timer will count to zero and the selected outputs will be driven. Under normal circumstance, the user will restart the WDT at regular intervals before the timer counts to zero.

SAMPLE CODE:

```
//-----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#include <dos.h>
#include <conio.h>
#include <stdio.h>
#include <stdlib.h>
#include "F81866.H"
//-----------------------------------------------------------------------------
int main (int argc, char *argv[]);
void EnableWDT(int);
void DisableWDT(void);
//-----------------------------------------------------------------------------
int main (int argc, char *argv[])
{
        unsigned char bBuf;
        unsigned char bTime;
        char **endptr;

        char SIO;

        printf("Fintek 81866 watch dog program\n");

        SIO = Init_F81866();
        if (SIO == 0)
        {
                printf("Can not detect Fintek 81866, program abort.\n");
                return(1);
        }//if (SIO == 0)

        if (argc != 2)
        {
                printf(" Parameter incorrect!!\n");
                return (1);
        }

        bTime = strtol (argv[1], endptr, 10);
        printf("System will reset after %d seconds\n", bTime);

        if (bTime)
        {       EnableWDT(bTime);  }
        else
        {       DisableWDT();          }

        return 0;
```

```
}
//-----------------------------------------------------------------------------
void EnableWDT(int interval)
{
	unsigned char bBuf;

	bBuf = Get_F81866_Reg(0x2B);
	bBuf &= (~0x20);
	Set_F81866_Reg(0x2B, bBuf);			//Enable WDTO

	Set_F81866_LD(0x07);				//switch to logic device 7
	Set_F81866_Reg(0x30, 0x01);			//enable timer

	bBuf = Get_F81866_Reg(0xF5);
	bBuf &= (~0x0F);
	bBuf |= 0x52;
	Set_F81866_Reg(0xF5, bBuf);			//count mode is second

	Set_F81866_Reg(0xF6, interval);		//set timer

	bBuf = Get_F81866_Reg(0xFA);
	bBuf |= 0x01;
	Set_F81866_Reg(0xFA, bBuf);			//enable WDTO output

	bBuf = Get_F81866_Reg(0xF5);
	bBuf |= 0x20;
	Set_F81866_Reg(0xF5, bBuf);			//start counting
}
//-----------------------------------------------------------------------------
void DisableWDT(void)
{
	unsigned char bBuf;

	Set_F81866_LD(0x07);				//switch to logic device 7

	bBuf = Get_F81866_Reg(0xFA);
	bBuf &= ~0x01;
	Set_F81866_Reg(0xFA, bBuf);			//disable WDTO output

	bBuf = Get_F81866_Reg(0xF5);
	bBuf &= ~0x20;
	bBuf |= 0x40;
	Set_F81866_Reg(0xF5, bBuf);			//disable WDT
}
//-----------------------------------------------------------------------------
```

```
//---------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//---------------------------------------------------------------------------
#include "F81866.H"
#include <dos.h>
//---------------------------------------------------------------------------
unsigned int F81866_BASE;
void Unlock_F81866 (void);
void Lock_F81866 (void);
//---------------------------------------------------------------------------
unsigned int Init_F81866(void)
{
	unsigned int result;
	unsigned char ucDid;

	F81866_BASE = 0x4E;
	result = F81866_BASE;

	ucDid = Get_F81866_Reg(0x20);
	if (ucDid == 0x07)                                  //Fintek 81866
	{	goto Init_Finish;	}

	F81866_BASE = 0x2E;
	result = F81866_BASE;

	ucDid = Get_F81866_Reg(0x20);
	if (ucDid == 0x07)                                  //Fintek 81866
	{	goto Init_Finish;	}

	F81866_BASE = 0x00;
	result = F81866_BASE;

Init_Finish:
	return (result);
}
//---------------------------------------------------------------------------
void Unlock_F81866 (void)
{
	outportb(F81866_INDEX_PORT, F81866_UNLOCK);
	outportb(F81866_INDEX_PORT, F81866_UNLOCK);
}
//---------------------------------------------------------------------------
void Lock_F81866 (void)
{
	outportb(F81866_INDEX_PORT, F81866_LOCK);
}
//---------------------------------------------------------------------------
void Set_F81866_LD( unsigned char LD)
{
	Unlock_F81866();
	outportb(F81866_INDEX_PORT, F81866_REG_LD);
	outportb(F81866_DATA_PORT, LD);
	Lock_F81866();
}
//---------------------------------------------------------------------------
void Set_F81866_Reg( unsigned char REG, unsigned char DATA)
{
	Unlock_F81866();
	outportb(F81866_INDEX_PORT, REG);
	outportb(F81866_DATA_PORT, DATA);
	Lock_F81866();
}
//---------------------------------------------------------------------------
```

```
unsigned char Get_F81866_Reg(unsigned char REG)
{
        unsigned char Result;
        Unlock_F81866();
        outportb(F81866_INDEX_PORT, REG);
        Result = inportb(F81866_DATA_PORT);
        Lock_F81866();
        return Result;
}
//-----------------------------------------------------------------------------
```

```
//-----------------------------------------------------------------------------
//
// THIS CODE AND INFORMATION IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY
// KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE
// IMPLIED WARRANTIES OF MERCHANTABILITY AND/OR FITNESS FOR A PARTICULAR
// PURPOSE.
//
//-----------------------------------------------------------------------------
#ifndef __F81866_H
#define __F81866_H                     1
//-----------------------------------------------------------------------------
#define F81866_INDEX_PORT               (F81866_BASE)
#define F81866_DATA_PORT                (F81866_BASE+1)
//-----------------------------------------------------------------------------
#define F81866_REG_LD                   0x07
//-----------------------------------------------------------------------------
#define F81866_UNLOCK                   0x87
#define F81866_LOCK                             0xAA
//-----------------------------------------------------------------------------
unsigned int Init_F81866(void);
void Set_F81866_LD( unsigned char);
void Set_F81866_Reg( unsigned char, unsigned char);
unsigned char Get_F81866_Reg( unsigned char);
//-----------------------------------------------------------------------------
#endif  //__F81866_H
```